

Forecasting Complex Political and Military Events: The Application of Expected Utility to Crisis Situations

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Abstract

This paper introduces the C2 community to a new technology based process that permits the analyzing and forecasting of complex political and military issues, with particularly reference to crisis decision making. Traditional crisis decision making exercises and simulations constrain role playing and the inability to utilize current information effectively. Exercises usually contain dimensions of artificiality or designs based on future scenarios. There is a need to create “real time” crisis decision-making environments where players can apply their current information base and manipulate hundreds of variables to achieve optimum outcomes. Our approach uses real world events and then forecasts their likely outcome — allowing players to engage in real time policy manipulation. In addition, we provide a means to alter policy actions to maximize national security gains. We demonstrate this analytical technology by offering the results of an experiment conducted during February/March 2000 at the National War College using the Chechnya crisis as a model.

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Forecasting Complex Political and Military Events: The Application of Expected Utility to Crisis Situations

Introduction

Substantial improvements in the conduct of wargaming and simulations have developed over the years. Nonetheless, fundamental problems remain unresolved. These problems fall into several categories.

First is the nature of role playing. Many games assign specialized roles to participants. This can take the form of “red” and “blue” teams of players, each representing a different country or set of actors. Or it may take the form of individuals acting as surrogates for policymakers in various official capacities. Players may or may not have direct experience with these roles. Some may come to the game cold—without prior experience or they are deliberately chosen to play outside their area of expertise in order to expand their experience base. On the other hand, sometimes policy maker players represent themselves in an attempt to introduce a high degree of accuracy to the game. Despite the role player or role played, this attempt to mirror crisis situations lacks fidelity and can contain significant sources of error.

Individual role players, knowing that they are in an artificial environment, may act differently than they would during a real crisis. They may bluff, preempt, or take other forms of aggressive reaction simply because it is a “safe” alternative—that is their actions have no permanent consequences. If role players are representing actors other than themselves, additional sources of error inevitably are introduced into the game or simulation. For example, it may be impossible to accurately reflect the thinking of a Chinese or North Korean leader during a crisis. At best the assigned player is representing a point of view that is filtered through the lens of an American background, with all of our cultural, political and historical characteristics as riders.

If the player has stepped out of character and plays a role of a policy maker with whom he or she has no first hand experience, error is introduced by assumptions of motivation, power, and politics. These assumptions, based on observation or face value, may have little basis in fact.

The second category limiting wargaming and simulations is scenario design. Over the years wargaming specialists have dramatically improved the reality and complexity of games. They have found techniques to introduce exogenous variables that complicate and confuse the environment. They have produced methods to create interactions or isolation among parties by limiting and parsing information. All of these developments are quite positive and contribute to the goal of replicating crisis situations with a high degree of accuracy. That recognized, crisis scenarios, by their very nature, are dim and often misleading reflections of actual crisis events.

It is commonplace to design crisis scenarios extrapolated from current events. However, these straight-line projections into the future are limited. In some cases they ask participants to

suspend disbelief. That is, a participant may personally believe that the scenario is unlikely to occur yet he or she is asked to participate in the unfolding events, hypothetically, as if it were a reality. In other cases, and most frequently in gaming, participants are asked to digest a set of facts or future conditions that create the backdrop for the crisis. By gaming ten years into the future, for example, participants are asked to accept a number of assumptions about how the world has changed, the new power relationships for that year, a new set of political leadership in the US and other countries, and various other conditions which in effect create an artificial environment. Though some of these background briefings for participants are quite rich in detail and sophisticated in their internal relationships, they cannot replicate the complexity of a real crisis event. Inevitably participants must pause during these games to inquire about the factual conditions operating in this artificial world.

The introduction of virtual worlds and conditions to gaming adds intensity, stimulation, and crisis atmosphere—all valuable characteristics, but it does not resolve the underlying issues mentioned above. What is needed to address these deficiencies is a real time crisis decision making mechanism wherein the players can not only bring to an exercise, but utilize the body of knowledge they have *at present about a real world situation*.

The Expected Utility Approach

The expected utility forecasting model is an iterative game-theoretic approach to simulating stakeholder interactions and resulting policy outcomes. It is a proven and highly accurate tool that policy makers can use to make sense of extraordinarily complex situations. Particularly effective for managing crises, the expected utility (EU) approach might seem exotic but its foundation rests on policy makers' common sense, decision logic, and self-interested patterns of decision making. Increasingly being used in government and business, the application has a documented track record of success. The framework encourages policy makers to think about crises in a more systematic, interlocking, and prioritized way—providing an effective tool for strategists. By simulating policy outcomes beforehand, negotiating strategies can be tested in advance, reliable coalitions can be constructed, mistakes avoided, and unanticipated policy consequences explored. EU analysis is a practitioner's tool, employing sophisticated, state-of-the-art technology, providing policy makers with an enormous advantage over competitors.

The EU model evaluates political decisions based on the tenets of the micro-economic theories of expected utility and game theory. This framework was initially developed to understand the dynamics of international conflict and applied to policy decisions and negotiations.¹ The approach models the “pulling and hauling” of stakeholder policy positions over time. The computer-based model takes input data and provides output that helps the analyst understand the policy forecasts it makes, the length of policy discussions, the nature of interactions among

¹ The history of modifications and developments of this model can be found in Bueno de Mesquita (1981), and Bueno de Mesquita, Newman, and Rabushka (1985). The approach has been applied in a number of policy contexts. Among others see evaluations by Bueno de Mesquita et. al. (1985, 1989) to Hong Kong, Kugler (1987) to the debt cartel in Latin America; Bueno de Mesquita and Stokman (1994) to the European Community, Abdollahian and Kugler (1997) in Russia, Berman and Abdollahian (1999) in South Africa and Kugler and Feng 1997, to a variety of foreign policy issues. Decision Insights Inc. (DII) provided the most recent estimation software.

policy makers (or stakeholders), what coalitions will form as well as which policy proposals are made. Given policy changes and shifts, the EU model iterates the process to approximate the policy process. Although the computer-generated output can be quite long (in some cases hundreds of pages), the information is presented in a consistently organized manner. The EU approach is useful to policy makers in real time. Feder (declassified 1994) reports that using information gathered from experts, direct comparisons between the EU analysis and experts' analysis shows that when a crisis is present, experts anticipate the outcome accurately less than *half the time*, while the EU model accurately accounts for over *ninety percent* of the outcomes.

Rather than replicating the formal presentation of the expected utility model, detailed previously by Bueno de Mesquita (1997), we will focus on the output and results of the EU model, and what these results mean for the analyst. This paper is designed to provide the analyst or game participant with a step by step guide to the model's outputs. Some of these provide the analyst/player with direct answers to policy questions: what will be the policy outcome and how will that outcome evolve over time. Other EU model outputs are more subtle, indicating the context and nature of policy dynamics: which policy makers are willing to take risks and what are policy makers' perceptions. This paper outlines the specific components of EU model's results. Before we illustrate the use of this decision-making technique, we will outline the basics of the stakeholder decision making approach.

EXPECTED UTILITY DECISION MAKING

Playing the Policy Game

To understand the fundamental nature of politics and negotiations, the EU approach concentrates on stakeholders. These stakeholders evaluate the costs and benefits associated with viable policy choices to obtain the largest net gain for themselves and their group at an acceptable level of risk. At this point, it is useful to make a coarse but appropriate analogy about politics, policy, modeling and poker.

Politics has often been referred to as similar to playing poker. In the game of five-card draw, a player is dealt five cards. Based upon those five cards, the player tries to put together a winning combination of cards: pairs, three-of-a-kind, four-of-a-kind, straights, flushes, etc. Given the possible card combinations in the player's hand, the player bets - investing in the "pot" - and decides which cards to discard and which cards to keep, trying to obtain the best hand possible against all other players. At this point, a player can follow two different decision logics.

First, the player can keep a certain number of "good" cards in their hand while discarding others, with the expectation that the new cards drawn will compliment the kept cards and strengthen their hand. The choice of how many and which cards to discard is based upon the likelihood of drawing the cards the player needs from a limited set (knowing that there are only 4 suits of cards, deuce through ace). This part of five-card draw is *decision theoretic*, because the player estimates the probability of receiving complimentary cards to the ones kept. Now with the new hand, the player can remain in the game by matching or raising bets based upon the strength of their hand or decide to fold.

If a player proceeded to bet based solely upon the strength of their hand, then we would suggest that the player would lose more often than not, a poor poker player indeed. This is because poker is just not a game of chance but of interaction with all the other players. The second component of choice in poker is *game theoretic* or *strategic*, where the player focuses on bluffing, posturing and signaling of their bet versus all other players. These strategic interactions between players are based upon any number of considerations. For example, if our player has lost a large portion of money following the purely decision theoretic approach above, then even with a poor hand, the player might keep raising the bet in hopes of bluffing others to fold. Such a player would be taking large risks in hopes of achieving a big payoff. However, if a player pursued this same strategy each time – large bets with a poor hand - then the other players would quickly learn and our poker player would lose. Likewise, if a player has won a lot of money and the pot is small, that player might not be willing to take risks, losing already amassed winnings.

There are a few parallels to draw from this example between politics and poker. First, policy makers are faced with a variety of choices in terms of what policies to pursue given their preferred policy outcome; which cards to discard given what they hold in their hand. Second, policy makers estimate the likelihood of achieving desired outcomes given the constraints – political or institutional - of the decision making environment; the probability of drawing complimentary cards. Third, decision-makers can challenge policy, seek allies to create coalitions or acquiesce; betting on the strength of their hand. Fourth, policy makers take risks depending on how close current policy is to their preferred outcome, accepting risks if current policy is completely dissatisfactory or being risk averse if their preferred policy is the current policy outcome; bluffing and betting big or folding and small bets. We do not wish to force this analogy too far, but it is a useful heuristic in understanding how the EU model simulates the policy dynamics between players or stakeholders in a political environment.

The Logic of Decisions

The logic of the EU model incorporates both the decision theoretic and game theoretic components of policy making. Several questions and choices confront stakeholders in the policy decision process: when to challenge policy, when to accede, are they powerful enough to unilaterally change policy, can they successfully overcome foes, which stakeholders will support their policy position, what compromises to make and what coalitions to form in order to achieve preferred outcomes. The core logic of the EU model for simulating stakeholders' decisions in the policy process rests upon the following notion:

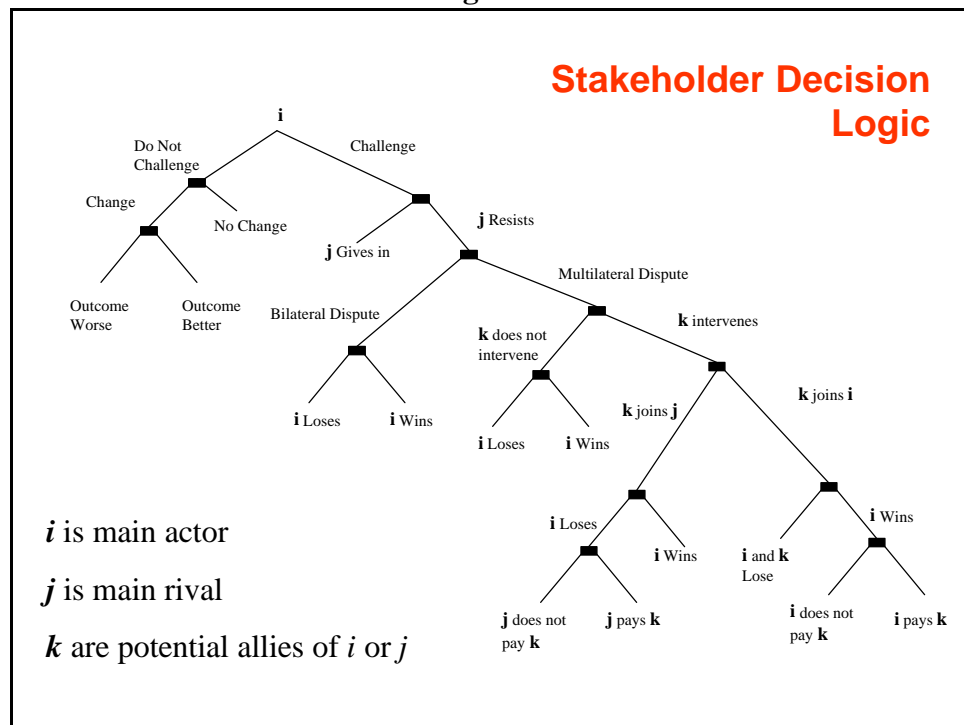
$$\text{Expected Utility} = (\text{Probability of Success} * \text{Utility of Success}) - (\text{Probability of Failure} * \text{Utility of Failure})$$

Decision makers evaluate whether or not they will challenge policy if their expected value for action is positive or negative. A stakeholder's probability of success depends upon its ability to influence – based on personal, organizational or national resources – as well as convincing other stakeholders to support them. The utility for success is the policy gains the stakeholder receives by acting and changing the policy outcome more in line with their desired position. The probability of failure is related to the constellation of opposing stakeholders while the utility of failure are the policy consequences from a failed policy challenge.

Figure 1 outlines the fundamental nature of each stakeholder's decision logic. The EU model incorporates several other decision and game theoretic components, but this is the basic decision problem facing each stakeholder. The model assumes each stakeholder uses this decision calculus to decide whether to challenge policy or not as well as who to challenge and who to engage as allies in supporting their objectives. This results in policy proposals and shifts on the issue.

In the figure below, stakeholder *i* is the main actor facing the decision tree. The tree outlines all the possible policy choices and outcomes *i* faces in the EU model. Outcomes on the left hand side of the tree are negative EU values for challenging policy while outcomes on the right hand side of the tree are positive EU values for challenging policy. What is not shown here, for clarity's sake, are the equations, utilities and probabilities attached at each decision node and outcome. The willingness of each stakeholder to take risks also effects these calculations. For a complete elaboration on the decision calculus, see Bueno de Mesquita (1997).

Figure 1



Given the decision path, *i* can either challenge a particular rival, *j*, on policy or choose not to challenge *j* to change policy. Let us first focus on *i*'s decision not to challenge policy on the left hand side of the decision tree. All outcomes on this left hand side of the decision tree result in a negative EU for the stakeholder to challenge policy.

If *i* decides that it is better off by not challenging policy, two things can happen: either the policy stays the same or the policy can change without *i*'s intervention. If the policy stays the same, *i* will receive the same benefits or alternatively losses from policy continuation. However, if *i*

believes the policy might change without i 's intervention, there is a probability that policy outcomes become better or worse for i based either on other stakeholder actions or exogenous events.

Let us now turn to the right hand side of the decision tree, where the stakeholder sees a positive EU for challenging policy. If i believes that there is a positive value for challenging rival j 's policy position, then i is faced with a litany of possible choices and outcomes. i can directly challenge j on the policy, where j either gives in to i 's policy demands or resists. If j acquiesces, i receives j 's support for i 's policy position. However, if j resists i 's demand, then the dispute may be settled in a bilateral or multilateral context.

If i decides to tackle rival j alone, then in the bilateral dispute either i can win or lose based upon its own estimation of its ability, in terms of resources, to win over j . On the other hand, if i believes that it cannot win against j in a bilateral contest, it might be able to enlist the support of third parties to create a coalition of support strong enough to overcome rival j .

By entering a multilateral dispute, i must calculate the effect of potential allies as well as potential foes that could join j . A potential ally or foe, k , can either join i or j . If k joins j in supporting j 's policy position, then i can either win against rival j 's policy position or lose. If i loses, then i would have spent political capital in not only challenging rival j on the policy, but moreover in seeking support from k . If i wins – with the help of k – then i receives its desired policy gains. However, by enlisting the support of third parties, i now must decide how to pay or reward third party allies for achieving its policy goals. i can either reward k , which results in a policy compromise between i and k (no compromise is necessary if they desire the same policy outcome), or i can try to impose its policy preference on k without rewarding k for its alliance.

Similar to the poker game, all stakeholders are confronted with this decision logic. The EU model places each stakeholder in this decision process and produces policy proposals based upon the results. However, the calculations for challenging or not challenging policy at each point are also affected by the willingness of stakeholders to take risks.

The Effects of Risk

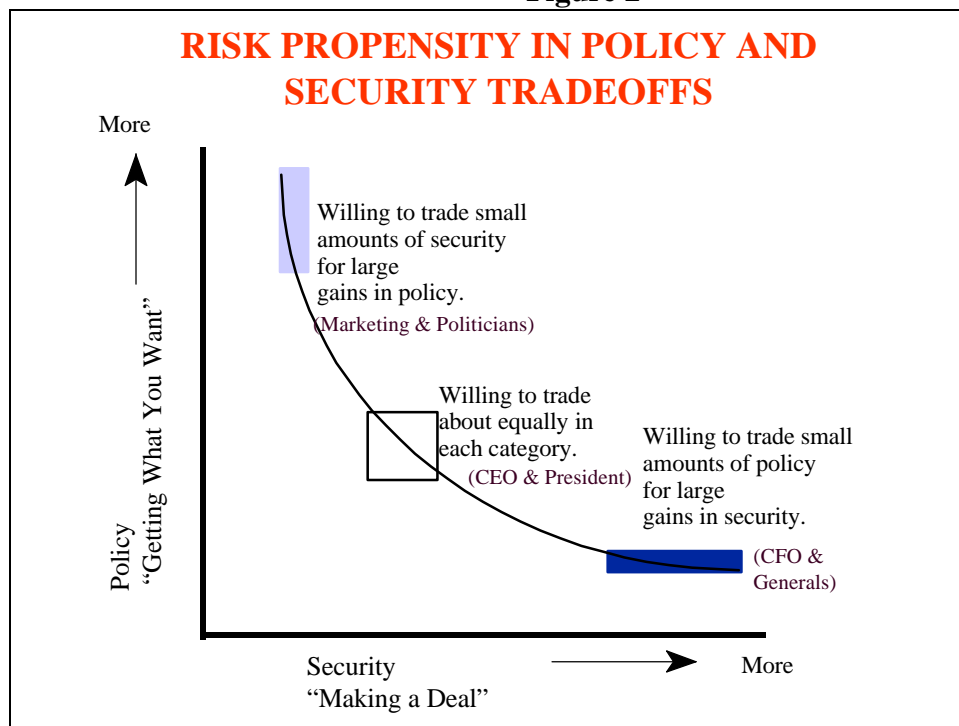
Stakeholder risk assessment is a subtlety of the EU model that helps the analyst place stakeholder behavior in context. Although knowing if an adversary is risk acceptant or risk averse is useful, it is more important to see how this impacts the decision calculus, translating this information into probable action and the subsequent effect on policy. All stakeholders take chances. Some are risk acceptant and will position themselves to act with exaggerated expectations of success. Others are risk averse and will take positions that underestimate their chances of success. Still others are risk neutral and act without distorting their objective chances of success. For a technical description of the EU risk calculation, see Bueno de Mesquita (1997).

We offer an intuitive explanation of risk in the EU model. The closer a stakeholder is positioned in terms of its policy stance to the current policy outcome, or alternatively to the policy position supported by a large majority, the more risk averse that stakeholder is. Close to their preferred outcome, these stakeholders are generally risk averse or policy satisficers. On the other hand, the further current policy is away from a stakeholder's preferred outcome, the more risk acceptant

that stakeholder is. Far from receiving what they want, these stakeholders will make large gambles in order to win; terrorists provide a nice example.

Figure 2 describes the nature of risk propensity in the EU model. The range of risk propensity can be envisioned as a trade-off between achieving the policy outcome desired versus the security of striking a deal with other stakeholders. The following examples are only generalizations as the EU model risk calculation for every stakeholder depending on the specific political landscape. Politicians and marketers, for example, are risk acceptant, willing to trade getting an outcome versus the outcome they desire. On the contrary, general officers and CFO's are more willing to trade some of the outcome they desire in order to achieve a more stable outcome. The President or a company CEO must generally balance policy gains with the security of reaching an outcome. While these examples are useful illustrations, what is important to remember is the effect risk has on each stakeholder's decision calculus.

Figure 2



The Decision Calculus

Each stakeholder on a specific issue is faced with the decision tree above and each makes an assessment based upon capabilities, policy position, risk propensity, and importance of the issue to the stakeholder as well as the constellation of all other stakeholders' capabilities, positions, and risks. The EU model calculates this process for each stakeholder, yielding a positive or negative utility for challenging other stakeholders on their policy positions. These positive or negative values can be placed together by stakeholder pairings to indicate the relationship between stakeholder pairs. While a conflictual or cooperative policy relationship between two stakeholders is interesting, the real analytical purchase from such an exercise yields the proposals

and compromises made by all stakeholders. Policy proposals and the subsequent responses begin to give insights into the process, anticipating policy dynamics and outcomes. The following figures illustrate all of the possible policy relationships between stakeholders, based upon the decision logic laid out above.

Figure 3 maps out the EU values for two stakeholders. Playing the policy game above, if the EU values are positive for both the focal and rival stakeholders as seen in quadrant 1, both the focal stakeholder (I-axis) and the rivals (J-axis) expect to gain against each other in a contest over the issue. Since both stakeholders expect to win policy gains by challenging each other's policy position, there is no incentive for either stakeholder to make concessions. This quadrant represents an unstable and highly confrontational situation known as the "crisis zone" - where the focal stakeholder will challenge the rival stakeholder over policy and vice versa.

Figure 3

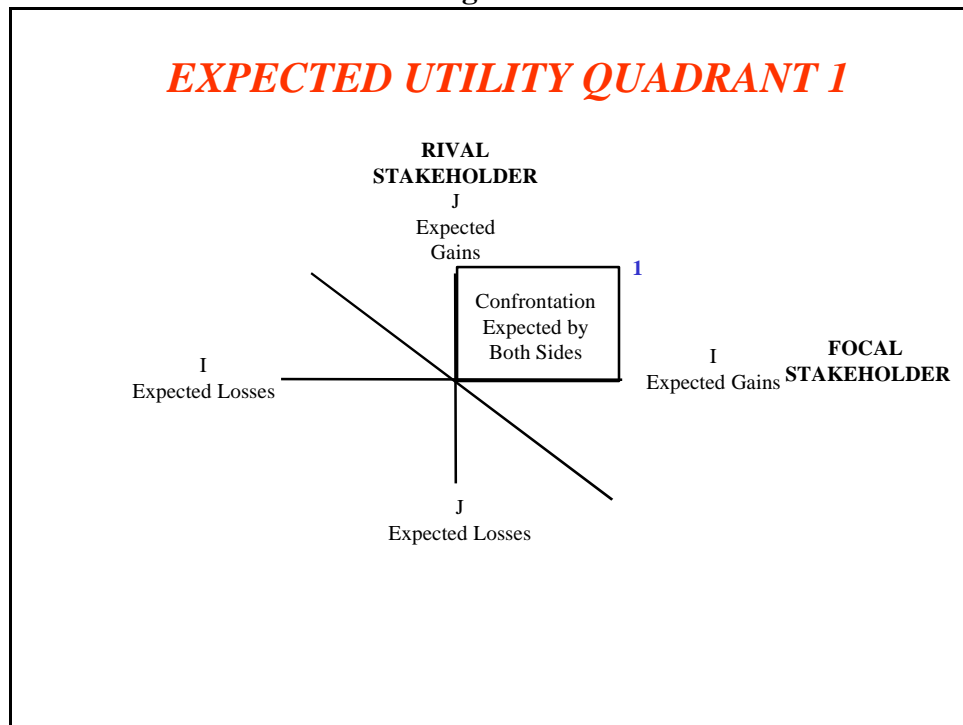


Figure 4 below depicts another potential relationship. If the focal stakeholder's EU for challenging policy is negative while the rival's EU is positive as seen in quadrant 2, the rival stakeholder has the advantage and the focal stakeholder will likely yield or negotiate a compromise favorable to the rival. The top half of the quadrant indicates that the focal stakeholder will offer a few concessions to its rivals, while the bottom half indicates that the focal stakeholder will give in entirely to the rival stakeholder's demands.

Figure 4

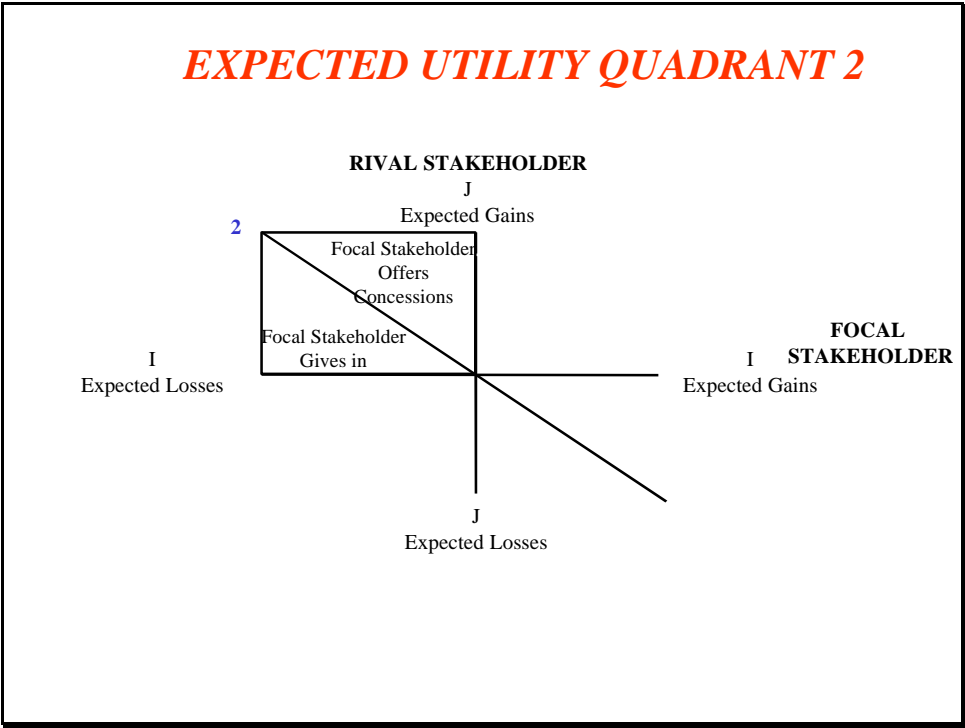
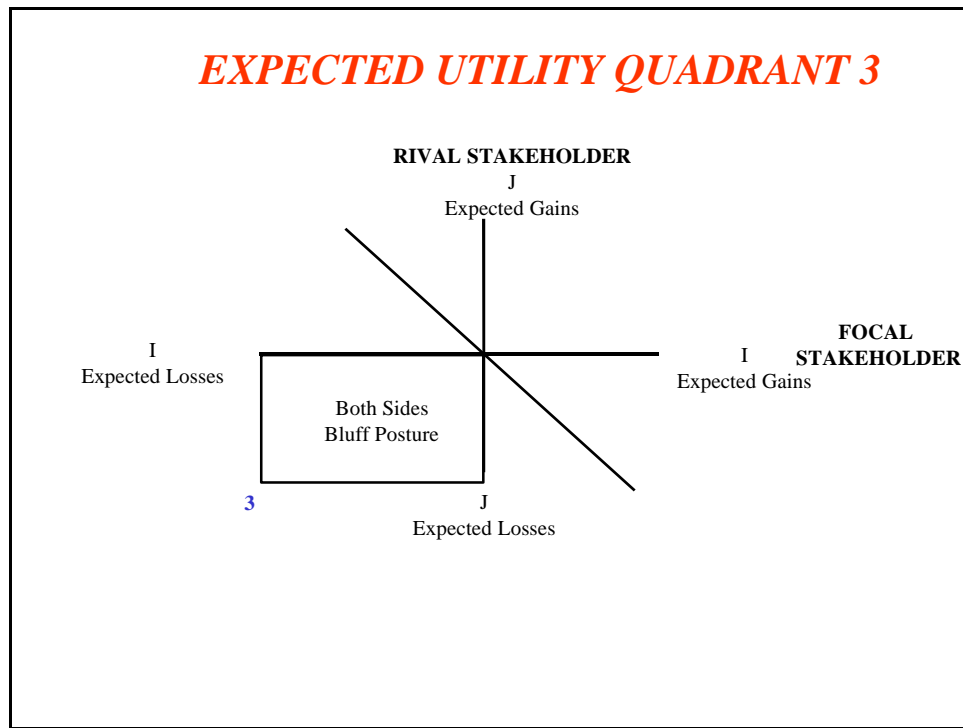
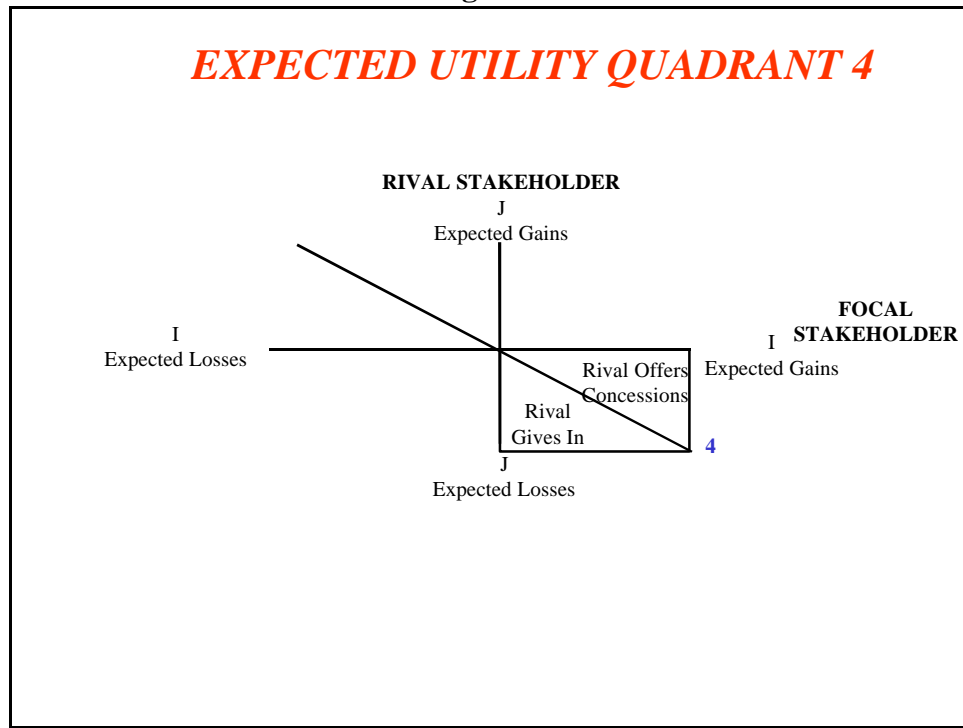


Figure 5



In figure 5, both the focal and rival stakeholders' EU values are negative as seen in quadrant 3. Both the rival and the stakeholder group expect to lose in a contest over policy against one another. Neither stakeholder intends to carry through with their demands, hence bluffing and posturing result in a stalemate. Conflict is highly unlikely in this quadrant, since both sides are bluffing or posturing and the status quo is expected to prevail.

Figure 6



In figure 6, if the focal stakeholder's EU is positive and the rival stakeholder's EU is negative as seen in quadrant 4. The focal stakeholder is expected to win and the rival will lose. What is negotiable is how much the rival can be expected to lose. If the rival fall into the top half of the quadrant, they will offer a few concessions to the focal stakeholder. They intend to negotiate a compromise, but they do not intend to lose much. The bottom half of the quadrant indicates that the rival believes they stand to lose even more than what the focal stakeholder is asking. If positioned here, the rival stakeholder will give in entirely to the focal stakeholder's demands. The objective, in either instance, is to identify non-threatening mechanisms through which the focal stakeholder can get rivals to make concessions.

Based upon these relationships, the model identifies the stakeholders who will press other stakeholders for policy gains as well as losses. Subsequently, stakeholders might compromise, acquiesce, fight or remain steady in their policy course. Understanding these relationships and how it affects the evolution of the policy process is a first step for the analyst. The EU approach models every stakeholders' expected utility for challenging vis-à-vis every other stakeholder and plays out the resulting policy proposals among all stakeholders. In this way, the EU model simulates the "pulling and hauling" of the policy process. We now turn to an application of the EU approach to a specific issue, illustrating the required inputs and substantive results of the analysis.

INPUTS TO THE EXPECTED UTILITY DECISION MAKING ANALYSIS

Very little specific input is necessary for this type of analysis. Data are obtained from issue area experts who provide evaluations on six essential items:

1. The issue and policy or negotiation continuum.
2. The stakeholders trying to influence the resolution of the issue.
3. The policy preference or negotiation position held by each stakeholder.
4. The relative influence or power of these stakeholders.
5. The importance or salience each stakeholder attaches to the issue outcome.
6. The stakeholders that have *veto* power.

1. Policy Continuum

An issue is any specific policy question for which different individuals, organized groups, or informal, interested parties (stakeholders) hold preferences regarding the outcome. The range of preferred outcomes on an issue must be represented along a single continuum. A number of such continuums can be used to fully represent complex policy. The right and left ends of each continuum specify the most extreme policy outcomes actually supported by any interested party. Of course, these extreme outcomes need not refer to a resolution that anybody believes will be achieved. Rather, they refer to positions that stakeholders currently support.

Intermediate points within the defined policy continuum reflect a progression in the policy space. Starting from the most radical position policy options, progressively moving to less radical alternatives; becoming progressively more conservative until the most conservative position is reached. We can then collect information on the specific groups that will compete to influence and decide policy in the policy space captured on this linear continuum.

The definition of policy preference held by each stakeholder constitutes a portion of the “art” in analysis. Almost any issue in dispute can be plotted on a single-issue continuum as an array of policy positions and outcomes. Experts then define the set of options facing the stakeholders and identify the positions on the continuum. However, capturing the exact nature of the issue and the policy space can take inductive horsepower.

2. Stakeholders

The first piece of data focuses on the stakeholders that dominate groups that are trying to influence the policy outcome. Stakeholders may consist of a single individual or an aggregation of individuals that:

- have a common pool of resources to draw upon,
- have a common willingness to expend these resources on the issue in question, and

- share a common objective regarding how the issue should be settled.

A complete list of stakeholders on any issue includes all individuals, groups or nations that have the potential to exert independent influence on the issue outcome. Thus, the number and type of stakeholders will depend on the issue under consideration.

3. Policy Positions

The first variable collected is the current policy or negotiating position on the issue continuum for each stakeholder. This position is not the outcome the stakeholder expects or is prepared to accept, but is the stakeholder's current negotiating policy stance. When the position has not been stated, it is best thought of as the answer to the following thought experiment: if the stakeholder were asked to write down his or her current position, without knowing the values being written down by other stakeholders, what would he or she write down as the stated position on the issue continuum? During negotiations the stakeholder represents a unified stated position for his group. This position will be the product of internal discussions among stakeholders within the group. When differences emerge within a group, the stated position for an individual stakeholder represent his or her clout within the group. Other stakeholder within the same group that lead contending factions should be used to represents alternate positions. Thus, unless a unified position emerges during their internal policy discussions, one group may have several voices. These differences have important consequences on shaping policy and accurately capture the subtle divisions between stakeholders within groups, organizations or nations.

4. Resources

Resources measure the total potential influence, capabilities or clout that a stakeholder can bring to bear upon influencing the outcome of an issue. This is a relative ranking of capabilities among all stakeholders on an issue, ranging from 0 to 100. The most powerful stakeholder on an issue is assigned a value of 100. More than one stakeholder can have the same potential resources. Each stakeholder is attributed a value relative to the most powerful stakeholder, and relative to other stakeholders. Thus two stakeholders with 40 and 60 would equal the clout of one stakeholder at 100. In a head to head contest with no one else involved in which everyone tried as hard as they could, the dominant stakeholder would be tied by an alliance between the two smaller ones. Moreover, two groups at 15 and 30 would, if they shared a common position, be very close in potential influence to a group at 40 and would just barely persuade the 40 to accept their point of view.

The resource scores should not be thought of as percentages. A decision-maker with a score of 100 does not have 100 percent of the resources and may, in fact, have only a small percentage of the cumulative total.

5. Salience

Salience captures the importance of the issue to each stakeholder. It measures the willingness to devote time, energy and effort to the issue whenever the issue arises, measured on the following 0 to 100 continuum:

90-100: This is my most important issue. I would drop whatever I am doing and turn to this issue whenever asked.

70-80: This is very important to me. It is certainly one of my most important issues. I would try very hard to reschedule to handle this issue when it arises.

50-60: This is one of several important issues. Others are more important. I would have to drop this if one of those others arose, but otherwise I will try to focus on this issue.

30-40: This is an issue I care about, but it is not that important to me. I have many more important issues to deal with and so generally would not drop what I am doing to deal with this and generally would focus on something else.

10-20: This is a minor issue to me. I rarely pay attention or make much effort.

Less than 10: I really don't care about this issue.

While resources measure the total potential capabilities a stakeholder has on an issue, salience acts as a weight. By multiplying resources by salience, we arrive at an estimate of actual influence stakeholders exert on a specific issue.

7. Veto Capability

The final variable collected determines which stakeholders have a veto on the decision making process, independent of their potential to influence the outcome on the issue. Veto stakeholders need to agree on a policy in order for a stable or enduring agreement to occur. Depending on the nature of the issue, veto stakeholders may or may not exist. It is often useful to distinguish between an actor's resources and veto power.

When veto players are present, the median voter forecast is not necessarily the predicted outcome. In the presence of veto players, the analysis requires that they all be at, or very near, the same position at the end of the analysis for there to be an agreed upon outcome. Such predictions will hold even if the majority objects. Veto players are the only stakeholders who actually must agree – with others serving as lobbyists, influencers or part of an institutionalized decision process. In Iraq, the position of Saddam Hussein is that of the veto player, despite any majority policy position. This is not to say that if veto players do not agree on a policy position that one cannot forecast policy outcomes. In this case, the policy will remain at the status quo or the position of whoever set the policy, indicating that the veto players cannot agree on changing current policy.

Applying EU to the Chechnya Crisis

Having explained the EU model, we now apply it to a current crisis event, the war in Chechnya. The analysis and results that follow are based on an experiment conducted at the National War

College in February/March 2000. Therefore the data and conclusions reached reflect the unfolding of events to that point in time.

We begin by recognizing that the distribution of preferences by political actors in the Chechnya crisis differs substantially. In general, Russian actors seek to regain control over the region. Chechens – using all their resources - seek independence or a large degree of autonomy. Foreign actors vary. Islamic nations lean towards Chechnya. The West favors a compromise solution that preserves a unified Russia. What will be the outcome? How uncertain is the process by which this outcome will be achieved?

Partial answers are forthcoming. From the data provided by an expert, the expected utility model produces a number of useful outputs in a dynamic, round by round simulation of the policy process.

- Forecasts
- Risk Assessments
- Stakeholder v. Stakeholder Perceptions
- Proposals and Opportunities
- Policy Shift Assessment
- Strategic Initiatives

Forecasts

The model provides a means to forecast the outcome of political interactions. The simplest forecast, useful under majority rule, approximates the likely outcome relying on insights from Black's (1958) median voter theorem. Stakeholders in any bargaining situation are treated as weighted voters to establish the median position, which is the winning outcome under majority rule. The importance of the median in American presidential politics has long been recognized, with the precipitous "race to the middle" by both Democratic and Republican candidates in a general election to capture votes. While the median position is useful in elections, majority rule does not apply in the presence of "veto" stakeholders (in our example, only President Putin and the Chechens are veto players).

Veto players can unilaterally prevent the implementation of an agreement. If veto players do not agree, median voter forecasts are not valid and will be effectively challenged. Under such circumstances one must pay attention to the configuration of veto players and contrast that with the median voter outcome. In our example, agreement is unlikely since the forecast for bargaining round 1 is limited autonomy (30) while the Chechnya leaders demand full independence (100).

At this point, it is useful to talk about the iterative nature of this model. The approach calculates the weighted median voter forecast given the initial input data provided by the expert, and then goes through the following calculations and procedures – risk propensity, stakeholder versus stakeholder perceptions, policy proposals and stakeholder policy shifts based on those proposals – and iterates the process, resulting in a forecast for Round 2. This new forecast comes from the

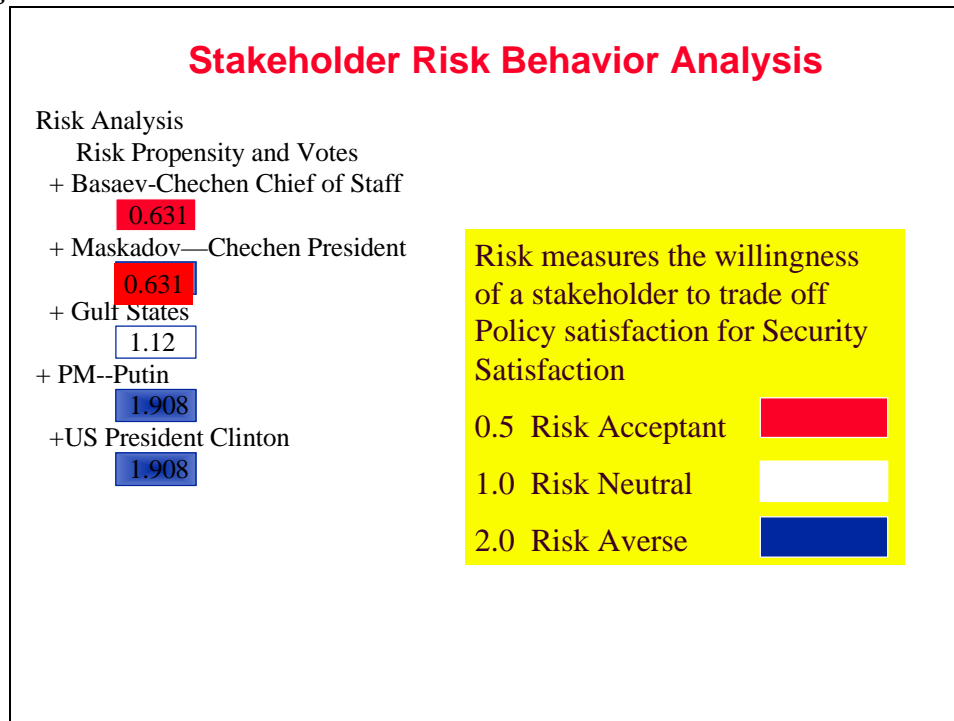
changes in stakeholders' positions on the policy issue. New positions change stakeholder decision calculus, risks, perceptions and proposals. The process could be repeated *ad infinitum*, but decision makers rarely debate policy endlessly. In this approach, the termination of policy negotiations rests upon stakeholders' expectation of gains from further discussions. If stakeholders believe that there are possible policy gains from continuing discussions, then another round of policy debate will occur. Conversely, if no progress or gains are likely, the model will identify the point in the policy dynamic where discussions would normally terminate. For a technical description of this discount function, see Bueno de Mesquita (1997).

Risk Assessment

From the original inputs, one can estimate risk propensity of stakeholders to reflect their willingness to take chances in order to achieve their goals. Risk is internally calculated by estimating the degree of exposure to defeat associated with each position. The more willing a stakeholder is to take risk, the fewer alliances they will seek to form. The less risk a stakeholder is willing to take, the more they will construct alliances to shore up a position.

A risk propensity score is estimated for each stakeholder. Scores are, measured on a scale of 0.5 to 2.0. Risk acceptant stakeholders, with low scores, (close to 0.5) position themselves near their least secure position. They respond as if they over-estimate the benefits and under-estimate the costs associated with the action. Such stakeholders are more likely to act when odds do not favor them. Risk neutral stakeholders with scores close to 1.0. They balance security versus policy trade off. Risk neutral stakeholders tend to accurately estimate the costs and benefits associated with actions taken or avoided. Risk adverse stakeholders with high scores (close to 2.0), choose position near their most secure policy position. These stakeholders under-estimate the benefits and over-estimate the costs associated with action and therefore are less likely to act (Bueno de Mesquita 1997). In this case, the outcomes are as follows for a selected set of stakeholders in Figure 7.

Figure 7



In the above illustration, Basaev – Chief of Staff of the Chechen’s, is the most risk-taking leader among this group of stakeholders. Indeed, given that Basaev’s preferred position supporting independence (100) is far from the forecast of limited autonomy (30) where the majority of other stakeholders concentrate. Continued military opposition in the face of the high likelihood of defeat justifies the high-risk score (0.6). On the other hand, President Putin and President Clinton both support the majority position and are quite risk averse. The Gulf States support a negotiated solution and are close to risk neutrality (1.1). These risk scores help begin to characterize stakeholders in their interactions and contribute to the production of important opportunities during the policy process.

Stakeholder vs. Stakeholder Perceptions

One of the main virtues of the EU approach is that each stakeholder may behave differently under conditions that seem identical from an impartial perspective, because each stakeholder’s perception is distorted by its own specific estimate of risk propensity that in turn is driven by the stakeholder’s position and security demands. For this reason, the actions of stakeholders are not identical, rather they are driven by their own perception of reality, and that reality is a distorted reflection of impartially derived options.

The EU approach suggests that effective political analysis requires that the expected utility perceptions of each stakeholder’s be compared to their perceptions of the expected utility of other stakeholders. Each stakeholder's perception of its ability to alter a policy depends on its own expectation of net gain against challengers. The challenger, in turn, compares its own expectations about himself or herself against that of the focal group. Objective evaluations of

outcomes may or may not reflect the reason for the initiation of actions. Indeed, estimates differ vastly.

We show below that the focal stakeholder's evaluation will differ from that of challengers, and these in turn will differ from the impartial estimates. Therefore, by considering the complex combination of perspectives in a multilateral environment, one can glean the eventual outcome of a contested policy issue. Because of the distortions introduced by resources, position, risk and salience, competing stakeholders perceive the relations between stakeholders on policy discussions differently. Committed risk takers for example, are far more willing to confront opponents to gains their goals, while risk averse actors will do so only when they hold a preponderance of resources.

All possible expected utility relations between the focal group and other stakeholders are described by combining full measure of options. These interactions will determine which of the many relationship actors face. To simplify this task we provide in Figures 8 and 9 a summary of perceived relationships that

- contrasts the perceived expected utility calculations of the focal group against all stakeholders,
- indicates how each rival stakeholder perceives its expected utility calculation against the focal group, and
- generates an “omniscient” view that combines the joint perceptions of both stakeholders.

Each combination of perception then generates a set of predictions regarding the policy choices of actors. These outcomes can then be used to form a summary of perceptions from the perspective of selected stakeholders under analysis. Figures 8 and 9 display the perceptual analysis for Putin and Basaev.

In figure 8 the Focal View column denotes the perception of the Putin regarding his relationship in policy discussions with the various stakeholders. The second column, Rival's View, shows the respective stakeholders' view of their relationship with Putin. As decision makers act based upon their perception in a given situation. The final column, Joint View, indicates the anticipated interaction between Putin and each stakeholder given their respective perceptions. The “+” indicates that the focal stakeholder is perceived to have an advantage in that situation while the “-” denotes that the focal stakeholder is perceived to be at a disadvantage.

Figure 8
Putin's Perception Analysis

Stakeholder		Focal View		Rival's View		Joint View
Basaev – Chechen Chief of Staff	+	Stalemate	+	Conflict	-	Give In
Maskhadov – Chechen President	+	Stalemate	+	Conflict	-	Give In
Afghanistan	+	Stalemate	+	Compel	+	Stalemate
Pakistan	+	Compel	+	Compel	+	Compel
Iran	+	Compel	+	Compromise	+	Compel
Kirienko – Russian Right	+	Stalemate	+	Stalemate	+	Stalemate

Gusinsky – Russian media	+	Stalemate	+	Compel	+	Stalemate
Morozov – Russian Regions	+	Compel	+	Compel	+	Compel
Turkey	+	Compel	+	Compel	+	Compel
US Sec of Defense	+	Compel	+	Compel	+	Compel
NATO	+	Compel	+	Compel	+	Compel
US Republicans	+	Compel	+	Compel	+	Compel
Chechen Opposition		No Issue		No Issue		No Issue
IMF		No Issue		No Issue		No Issue
US Democrats		No Issue		No Issue		No Issue
Bill Clinton		No Issue		No Issue		No Issue
US Dept of State		No Issue		No Issue		No Issue
Russian Duma		No Issue		No Issue		No Issue
Zuganov – Communists	+	Compel	+	Compel	+	Compel
Zhirnovsky – Liberal Democrats	+	Compel	+	Compel	+	Compel

Figure 9
Basaev's Perception Analysis

Stakeholder		Focal View		Rival's View		Joint View
Maskhadov – Chechen President		No Issue		No Issue		No Issue
Afghanistan	+	Conflict	+	Conflict	+	Conflict
Pakistan	+	Conflict	+	Conflict	+	Conflict
Iran	+	Conflict	+	Conflict	+	Conflict
Kirienko – Russian Right	-	Conflict	+	Stalemate	+	Compromise
Gusinsky – Russian media	+	Conflict	+	Stalemate	+	Compromise
Morozov – Russian Regions	+	Conflict	+	Compromise	+	Compromise
US Sec of Defense	+	Conflict	+	Compel	+	Compromise
Turkey	+	Conflict	+	Stalemate	+	Compel
NATO	+	Conflict	+	Compel	+	Compel
US Republicans	+	Conflict	+	Stalemate	+	Compel
Putin	-	Conflict	-	Stalemate	+	Compel
Chechen Opposition	-	Conflict	-	Stalemate	+	Compel
IMF	+	Conflict	+	Compel	+	Compel
US Democrats	+	Conflict	+	Stalemate	+	Compel
Bill Clinton	+	Conflict	+	Compel	+	Compel
US Dept of State	+	Conflict	+	Compel	+	Compel
Russian Duma	+	Conflict	+	Compel	+	Compel
Zuganov – Communists	+	Conflict	-	Conflict	+	Conflict
Zhirnovsky – Liberal Democrats	+	Conflict	+	Conflict	+	Conflict

Comparing figures 8 and 9 that represent Putin's and Basaev's view, we can see that these two actors perceive the situation quite differently and will act accordingly. Putin believes that the Chechnya rebels have been stalemated. Basaev's assessment is that conflict must continue since this option is viable against most players. Looking across these two perspectives suggests that Putin's evaluations are closer to the likely outcome. Note that both objective evaluations favor Putin's claims. However, not too much should be inferred from the dyadic evaluations presented

in the above figures. They only represent the perceptions for two of the many stakeholders. The model calculates and reports the perceptions for all groups, and then provides a mapping of all stakeholder relations and potential policy interactions. Based on such evaluations one can make forecasts of future moves and strategic opportunities.

Proposals and Opportunities

Using differences in the perceptions of competing stakeholder about policy outcomes, one can anticipate bargains that stakeholders will make. Based on this information one can also anticipate those that they will keep. The EU model identifies proposals and opportunities that all stakeholders will make to all other stakeholders. For example, Figure 10 lists the proposals that the Basaev will make. Indeed, he will propose independence for Chechnya to almost all the opposing foreign stakeholders hoping for support. The US and western allies are willing to listen, but are not willing to support since other actors make more attractive offers. Furthermore, Basaev has no unseen opportunities where a new strategic move could be engineered. In sum, a proposal is credible but only to the level where the EU model indicates compromise is achievable, if and only if, that stakeholder does not receive another better proposals from other stakeholders. By better we mean a proposal that requires less adjustment from the original position held by the actor. In this case, the US actors are very close to limited autonomy and Putin can and will make that option the more attractive offer. This is very important. In our model if a stakeholder is forced to change its policy position, she or he will modify that policy position the smallest amount possible.

Figure 10
Basaev's Perception Analysis

Stakeholder	Original Position	Make Proposal	Credible	Unseen Opportunity
Afghanistan	80	100.0	None	None
Pakistan	80	100.0	None	None
Iran	80	100.0	None	None
Kirienko – Russian Right	55	None	None	None
Gusinsky – Russian media	50	100.0	None	None
Morozov – Russian Regions	50	100.0	None	None
Turk	45	100.0	None	None
US Sec of Defense	35	100.0	98	None
NATO	35	100.0	98	None
US Republicans	35	100.0	98	None
Putin	30	None	None	None
Chechen Opposition	30	None	None	None
IMF	30	100.0	98	None
US Democrats	30	100.0	98	None
Bill Clinton	30	100.0	98	None
US Dept of State	30	100.0	98	None
Russian Duma	30	100.0	98	None
Zuganov – Communists	0	100.0	None	None
Zhirnovsky – Liberal Democrats	0	100.0	None	None

In this case, Basaev's demands to the all actors are not credible and will be rejected. Recall that all this information is based exclusively on the four critical inputs provided by the expert:

stakeholders, policy position, influence, and salience. All evaluations and insights are driven by this information and not by external insights about the situation at hand. Indeed, this is a general model of decision making in crisis situations where the only elements altered from application to application are the inputs, not the decision logic.

In many situations opportunities emerge that can be utilized to achieve optimal policy outcomes for a specific stakeholder. The model allows one to avoid making proposals that will be rejected, weakening ones initial position, and can identify unseen avenues to pursue one's policy. It discloses is to what degree agreements will be held and what will be the level of conflict that surrounds such actions. Policy practitioners can choose which policy avenues they wish to pursue given this information.

All the elements described thus far can be incorporated into a dynamics assessment of this policy evolution.

Policy Assessment: Chechnya War

Only the inputs described above are incorporated into the analysis. Figure 12 shows the dynamic policy interactions that produce shifts in stakeholders' policy positions in response to pressures from all other competing stakeholders. Stakeholders receive all proposals and change their policy position according to the best offer for creating supporting coalitions or acquiescing to adversaries. Given these policy shifts, the EU model reports which stakeholders change their policy positions and by how much. The EU model then takes the policy shifts and reiterates the decision process to see how anticipated changes in stakeholder positions affect the outcome. At each point, the model discloses new opportunities for stakeholders to make offers to others.

To ease the display of results, we have simplified the presentation by including only a small number of key actors, but their movements are still influenced by the remaining larger set. Figure 11 shows the evolution of key stakeholders' policy positions over time (in this case, four iterations of the model) while Figure 12 shows the same outcome in a three dimensional representation of all stakeholders. Both represent identical situations.

As one would have anticipated from the description of position and risk propensity, the Chechen stakeholders continue to demand independence (100) despite massive opposition. Putin is willing to grant limited autonomy (30). The Duma and eventually Clinton and Ziganov after some vacillation join the Prime Minister. Zhirnovsky continues to argue for a harsher policy. Despite the majority consensus, the Chechen rebels will not support of the median voter in this country and continue the conflict. Figures in the appendix permit a better view on individual actors. Pakistan and Iran are expected to decrease support for the Chechen rebels over time. Afghanistan on the other hand is expected to continue to provide support for this rebellion.

Figure 11
The Dynamics of Chechen Autonomy: Position Shifts of Key Stakeholders

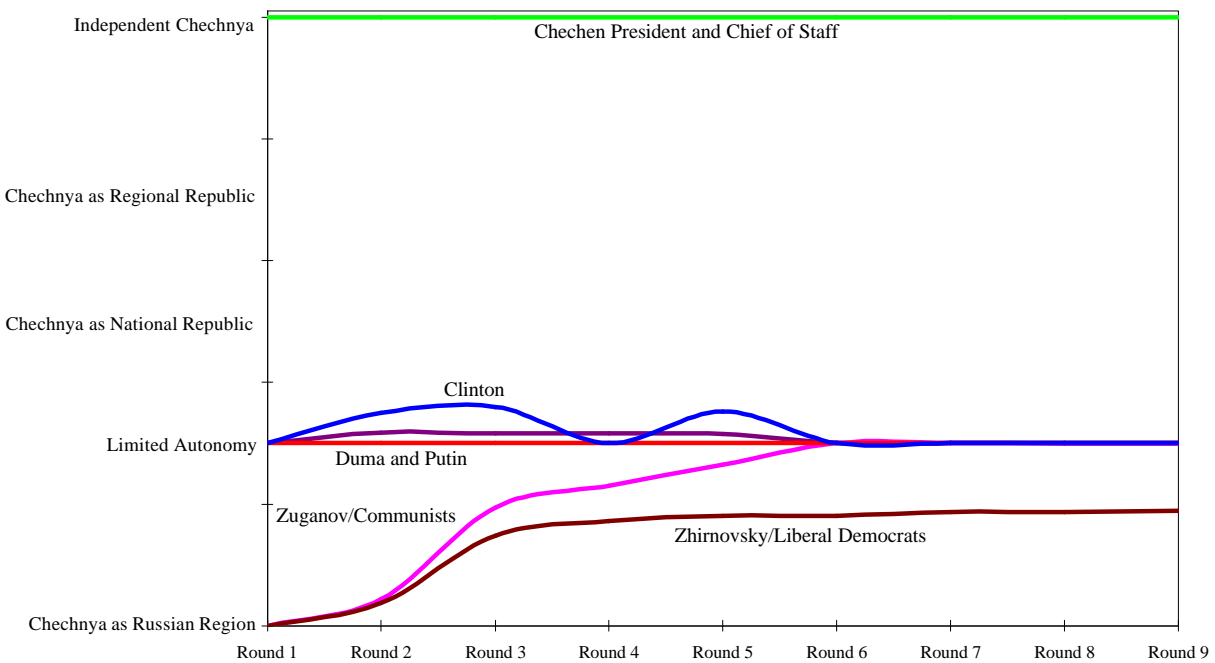
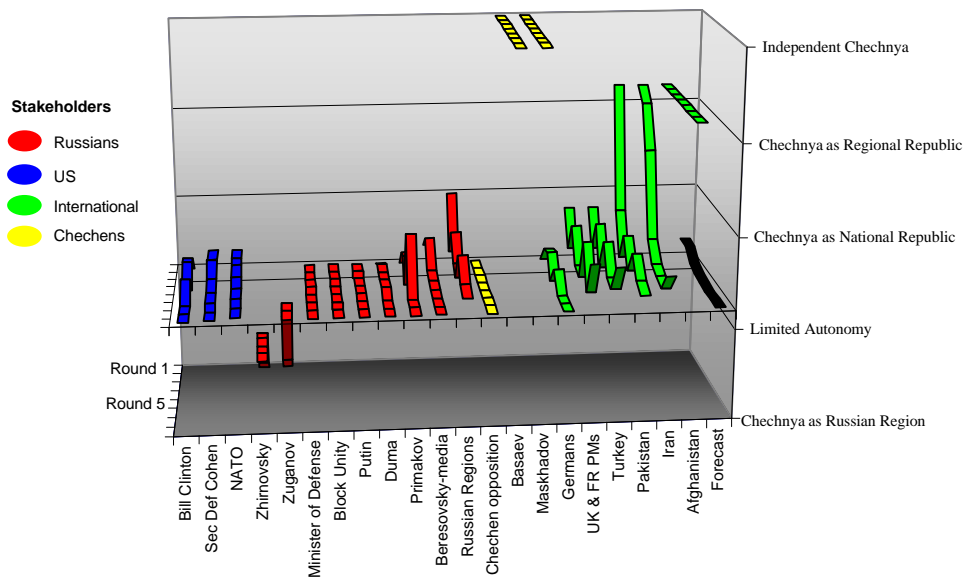


Figure 12
The Dynamics of Chechen Autonomy: Position Shifts of Key Stakeholders



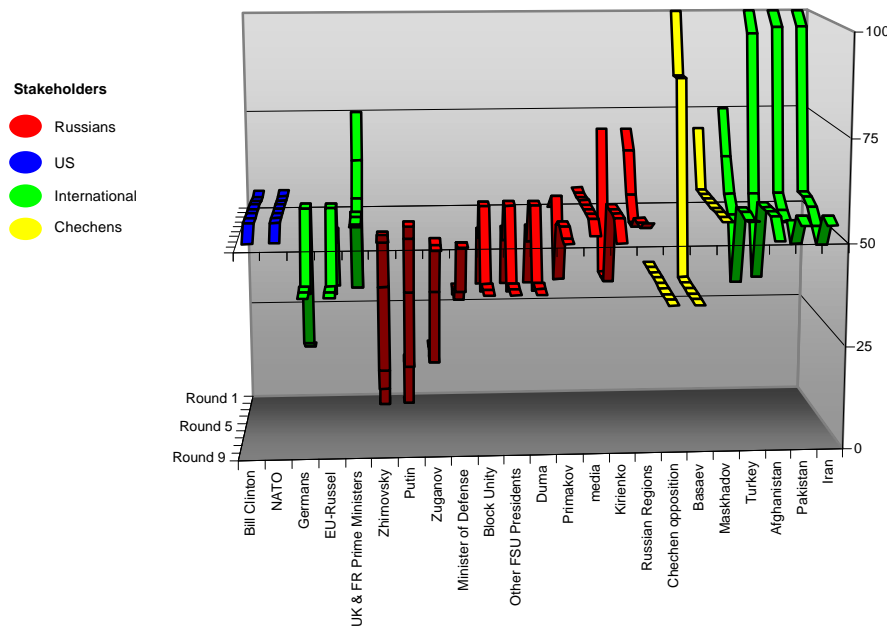
We expect this conflict to continue.

Strategic Initiatives

The EU model is a powerful tool in anticipating policy dynamics and outcomes. It is also used to simulate changes in opening policy positions to see if different policy positions produce better outcomes. Of course, one's definition of a better outcome depends on the policy position advocated. The EU model allows policy makers to simulate changes to see if it produces not only better outcomes, but moreover can create stable political coalitions supporting policy. Policy goals can be achieved at the expense of political support and conversely. Understanding this fundamental point takes us from the deductive realm of policy modeling into policy ontology. Although EU policy analysis is not normative, its application has significant normative consequences.

EU evaluation of the politics underlying the Chechen crisis shows that there are very few opportunities to resolve the current conflict by negotiations. In each iteration of the model, the analyst needs to look for beneficial opportunities that can be exercised to improve policy outcomes. There are possible unseen opportunities and many more opportunity summaries that the model indicates for each stakeholder. When unseen opportunities do not exist, the EU model allows a policy maker to test different policy positions from those currently taken. Figure 13 illustrates how a change in US position and increased diplomatic involvement could affect the outcome of the Chechen crisis.

Figure 13
US Policy Option for Chechen Autonomy Post Elections: Stakeholder Anticipated Position Shifts
US adopts position 55 and increases salience from 30 to 60



The EU analysis indicates that proactive measures by the United States could prompt a negotiated settlement. If the United States adopts a unified and aggressive posture - demanding that Chechnya become a national Republic within the Russian federation (position 55 and doubling salience) - a negotiated solution can emerge. Figure 13 shows that this approach effectively ends Chechen guerilla activity and brokers a “zone of agreement” between the combatants.

This US initiative convinces the Chechens to approach the bargaining table in good faith and provides the Russians with an exit option from a protracted and costly conflict. The international community will concur, helping forge an agreement, saving face and political capital. Chechen rebels will find that external support for continued guerrilla activity in this climate will dry up. Although both Russians and Chechens will dispute specific details on Chechen autonomy levels, negotiations are expected to result in an agreement. Later we show that this US policy action, while important in stabilizing the Chechen conflict, could have negative consequences for US discussions with the Russians on the ABM treaty (see ABM Discussions below).

Simulations show that other US policies are not successful. Neither Clinton nor Albright can improve the US policy outcome with other alternatives. Although there are opportunities to do so, aligning with either the Republican or the Georgian/Turkish positions produces no gains. Furthermore, increasing pressure on the Russians given current US policy does not improve the expected outcome.

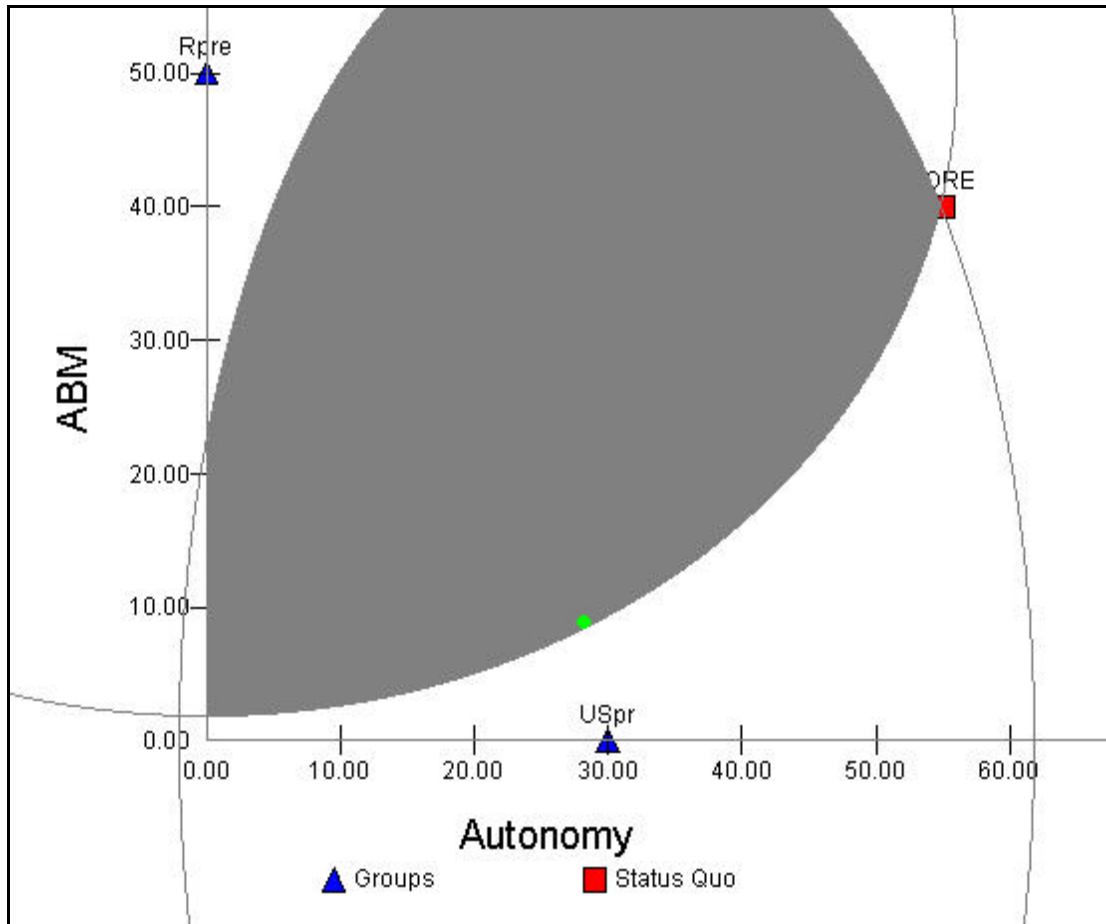
The critical point to understand as a policy analyst/game player is that while a negotiated settlement may lurk around the corner, what decision makers choose in real time are options that may be sub-optimal. Remember, in order to achieve this outcome, the US would have to publicly change its position and increase diplomatic pressure at the expense of other goals. This example illustrates the importance of realizing the price of policy goals.

Additional Complexity: Trade-Offs on Multiple Issues

Experience with a large number of cases suggests that problems are seldom confined to one issue. Chechen autonomy is only one component in the larger US-Russian bilateral context: economic reform, arms control, IMF loans, and so on, may all be intertwined. Indeed, proposals to stabilize a crisis are frequently multidimensional, where actions on one issue affect the possible success of developments in another. Moreover, very different constituencies are affected as one achieves success or failure on policy from one area to another.

The EU model described above analyzed the policy process along a single issue area. Of course, the same process can be applied to all the other issues within the larger policy picture. By performing the EU model on several issues in parallel, outcomes on each of the issues can be anticipated and new opportunities to affect outcomes may emerge. Combining the results of the EU model on several single issues we can simulate the effect of trade-off among such issues. This procedure allows the extension of EU analysis to multiple dimensions. Figure 14 below illustrates how tradeoffs could be useful in US-Russia negotiations. Note that the tradeoffs described in Figure 14 are useful to advance US goals, but can be gained only by forgoing an US key role in the settlement of the Chechnya crisis described in Figure 13 above.

Figure 14
US Policy Option: Linking Autonomy with ABM
 Executive Agreement



In this case, we are looking at two issues. The issue on the horizontal axis is a autonomy issue. The issue on the vertical axis is the far more important ABM negotiation between the US and Russia. Given this two dimensional space, key veto players' policy positions are plotted – President Clinton and PM Putin. At 100 on the ABM scale, the treaty would be suspended, at 50 both sides would comply with the ABM treaty as written, while at 0, new ABM programs are permitted under the treaty. Both Clinton and Putin have positions on these issues. Notice that on each issue the current policy status quo is identified.

From each stakeholders' policy position on both issues, an indifference curve is drawn through the current policy status quo. This indifference curve marks the limit of better policy combinations for each stakeholder. In other words, any combination of Chechen autonomy and ABM modification inside the stakeholder's indifference curve is closer to that stakeholder's preferred policy outcome.

By looking for the intersection of all stakeholders' indifference curves, we identify a trade-off on both issues where each stakeholder would be better off accepting a deal. In Figure 14, the shaded oval indicates an area of agreement among Clinton and Putin. Any policy outcome within the oval is a better policy outcome than the status quo. Since we want to optimize policy for the US, the analyst can choose the policy that is closest to the US' preferred position on both issues but is still within the feasible winset. In policy terms, the US proposal to achieve Russian agreement on extending the ABM treaty to potential new weapon systems is gained at the expense of a potential settlement in Chechnya by backing Putin's military objectives. Were the United States to agree with the Russians by supporting regional status for Chechnya (30 on autonomy scale), Putin could be persuaded to agree to US proposals on ABM expansion (close to position 10 on the ABM scale). Compromises like these can help in the resolution of complex crises.

Note that linking ABM with autonomy preempts the ability of the US to broker a lasting settlement in Chechnya. Essentially, potential gains on ABM expansion can be achieved at the expense of the US position on Chechnya autonomy. Pursuing one strategy prevents the optimization of US policy on the other.

While much folklore has been written about complex negotiations with multiple tradeoffs along several dimensions, our experience indicates that multilateral tradeoffs or winsets are not always profitable. Several fundamental reasons combine to produce such outcomes. First, as new stakeholders enter the picture, the complexity of compromises increases. Second, when stakeholders occupy the forecast along one or more dimensions, they are immune to offers from third parties to change their positions because trading one issue for another is counter-productive. Finally, while a point outcome is possible on a single policy, along multiple dimensions outcomes are described by winsets that describe an area of policy outcomes. As the number of dimensions increase so does the shape and size of such winsets. This tremendously increases the potential range and combination of potential policy outcomes. Moreover, within a winset all offers are similar. This produces the familiar logrolling of policies or potential for continuing counter-offers without a settlement. However, winsets and multi-dimensional analysis are often useful in solving policy deadlock, by specific stakeholders trading one issue for another to create more political support and then re-deliberating on a single policy issue.

Uncertainty

Many things that we do not know about policy are caused by uncertainty. However, the EU structure allows one to explore the possible effects of unexpected changes on policy outcomes. In several instances, reducing uncertainty provides very powerful insights about the future. We chose to concentrate on three areas:

- At what cost will this conflict be settled?
- How robust are current evaluations to unpredictable exogenous shocks?
- Could decision makers take advantage of exogenous shocks to produce policy changes?

Cost of Settlement

One approach to diminish the uncertainty about the cost and duration of a conflict is to simulate its likely evolution to determine the level at which a stable settlement is reached. In the case of Chechnya we simply ask: what level of resource reduction is required before the Chechen rebels are willing to join the solution offered by the Russians? We concentrate on the weaker side because they are more likely to seek negotiations given Russia's military superiority.

Waging war reduces the power of opponents. Also, waging war affects the willingness of opponents to fight. After exploring this issue with the expert, we concluded that the Chechens' commitment to independence is exceptionally strong and is not likely to wane without a prior reduction in their ability to fight. Indeed, every indication from the field suggests that commitment is increasing with every casualty. From the perspective of uncertainty, war is a simple test since all conflicts come to an end. Levels of casualties associated with termination vary substantially. For international wars, population losses as high as 20% of total population have been registered before surrender. In the case of domestic conflict research is less clear, but we find no record of losses that exceed 30% of total populations. Attritions of up to eighty percent of the fighting force have been recorded. In guerrilla war survival can depend on a very small core. It is possible to defeat the opposition, as Batista did during Castro's initial invasion of Cuba, or the Russian's did in Grozny, without bringing the conflict to an end.

One way to decrease the degree of uncertainty about the duration of this war is to simulate what reduction in Chechnya's ability to fight would persuade the Chechen rebels to accept the Russian offer. Figures 15 and 16 presents estimates of power reduction that are quite disturbing. Figure 15 suggests that a *reduction* in power of between 80 and 90 percent is required to persuade the Chechen rebels to accept the terms presently offered by Russia.

Figure 15
Pre-Election Autonomy
Summary of the Effects of Eroding Chechen Resources

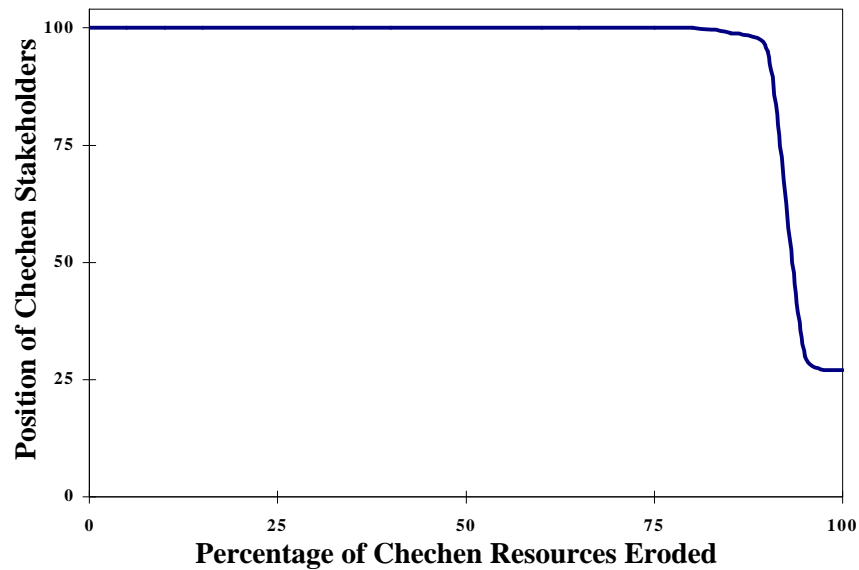
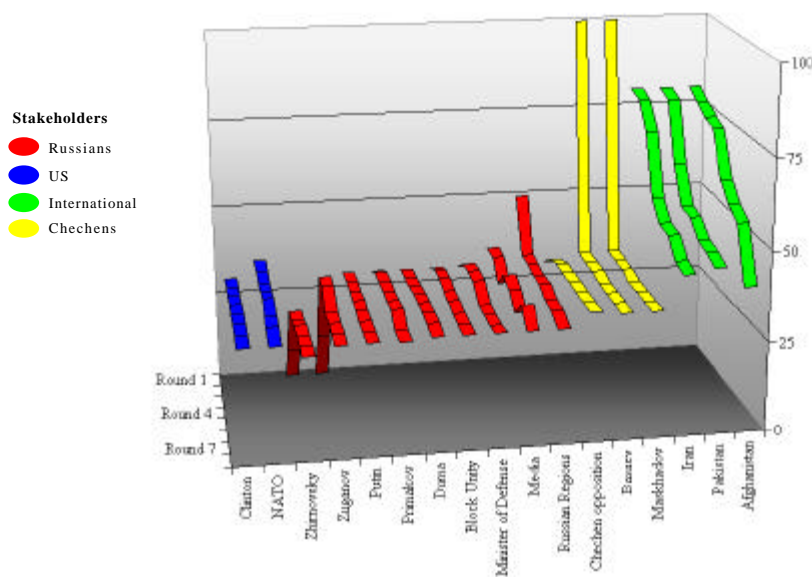


FIGURE 16
Pre-Election Autonomy Reduce Chechen resources by 80- 90%



Using information gathered from our simulation, Figure 16 re-analyzes the original data reducing the resources of Chechen rebels by the anticipated level to determine if a stable solution emerges. This is indeed the case. Were the Chechen rebels to lose between 80% and 90% or more of current resources, they would acquiesce and accept limited autonomy within Russia. All Russian

factions would also accept this action. The United States and NATO would concur. Finally, Pakistan, Iran and Afghanistan, who support the Chechen cause, likewise would acquiesce. The policy implications of this analysis are grim. To achieve its objectives without compromise, Russia could follow a policy of extermination in Chechnya.³ Under this scenario, the resistance is expected to collapse. If a more benign policy is implemented, a settlement on Russia's terms is unlikely.

The EU analysis indicates that hopes for an easy negotiated settlement are unrealistic. Only very complex and intricate arrangements that involve Russian and foreign actors could reduce the level of this conflict. Since the required parties are not so motivated at this time, this conflict is likely to linger and escalate in its brutality. Are there other means to settle this crisis that have not been explored?

Robustness of Evaluations to Unpredictable Disturbances

What means do stakeholders within Russia or Chechnya have at their disposal to initiate policies, currently not foreseen, that may change this conflict fundamentally. Are there unseen actions that can lead to major breakthroughs? Egyptian President Sadat's peace initiative in the Middle East, for example, altered the negotiation environment between Israel and Egypt. Likewise, secret and unexpected negotiations between Israel and Palestinians in Norway led to the discussions and results we are now witnessing. Can we expect such unpredictable breakthroughs in the near future in Chechnya?

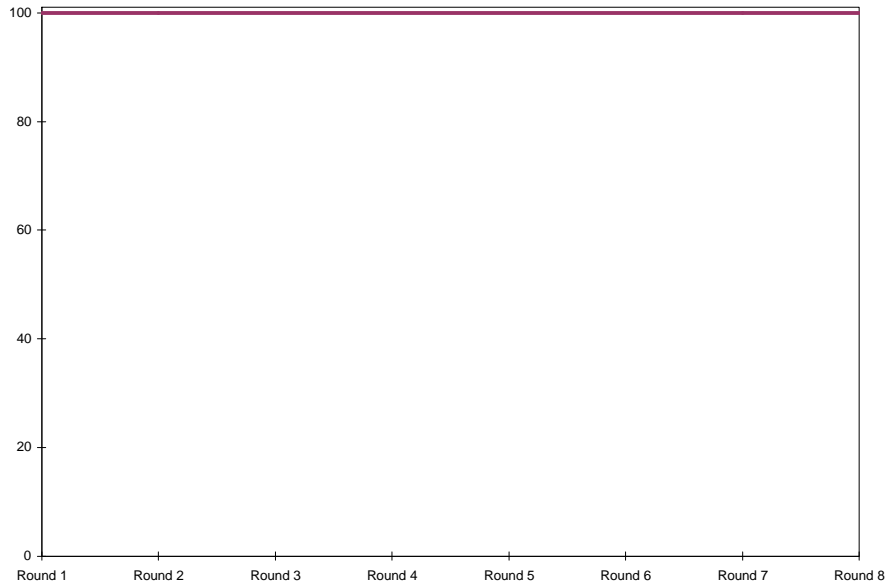
One way to explore the uncertainty surrounding a number of possible initiatives is to allow stakeholders to vary their salience randomly. These simulations could identify new, unexpected opportunities to alter the existing situation. We explored in part a set of such opportunities and present the results from the perspective of the two veto stakeholders the Chechen rebels and Putin. While this effort is not exhaustive, it illustrates the procedure one can utilize to reduce uncertainty about future policy.

To limit the uncertainty surrounding this crisis, we first vary at random the salience of stakeholders involved, and then explore if such changes produce promising opportunities. This procedure can be generalized to all stakeholders that have a stake in the Chechnya to identifying unexpected events and opportunities.

Figure 17 reports results from the Chechen perspective. Using a sample of 50 fifty random runs, we observe no difference in the anticipated actions by the Chechen rebels. These stakeholders are committed to conflict *regardless of variation* in the commitment of other stakeholders. It is unlikely, therefore, that Chechen leaders will respond to unexpected variations in the support of allies and concessions from opponents. Consistent with the results presented in Figures 15 and 16 above, we anticipate unwavering commitment to independence from the Chechen side.

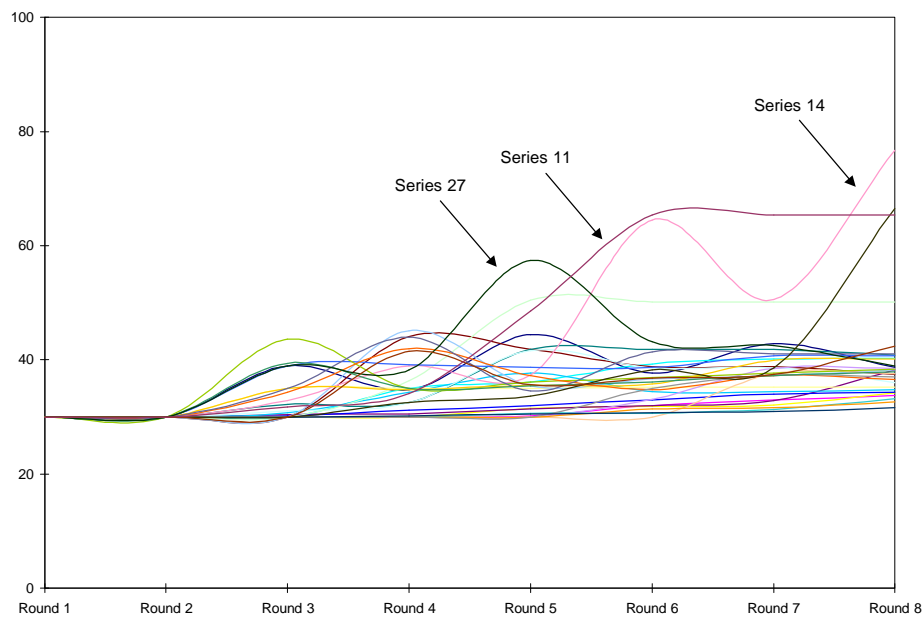
³ While the whole population of Chechnya is not included, the levels of casualties among the active stakeholders involved in this conflict required to settle this conflict by force are staggering.

Figure 17
Chechen Autonomy: Chechen Random Saliency Sensitivity Analysis



To reach a solution, random variations should produce moves among veto actors that lead them to a compromise. Despite some early promise, we have not been able to do so here. Figure 18 provides a review of Putin's opportunities. Series 11 in Figure 18 shows that *if* the principal Russian stakeholders opposing Chechen independence are no longer fully committed to their initial position, additional autonomy for Chechnya could be negotiated. Putin, Zhirnovsky, Zuganov, and Kirienko all would seek an accommodation in this simulation. However, this solution still falls short of Chechen expectations. Series 14 presents the same basic story as Series 11 but here the Russian media is energized and drives the solution. Series 27 identifies the role that more energized Muslim states and the Russian media could play if committed to do so. Opportunities for a settlement do not emerge.

Figure 18
Chechen Autonomy: Putin's Random Saliency Sensitivity Analysis



This review of veto actors indicates that initiatives for peace could come from Russia but the Russian leadership is unlikely to agree on this course of action. Recall that Figures 15 and 16 show the Chechen resistance will not agree to peace *unless* the war escalates and they are decimated. Putin's proposals for peace are likely to fall short of Chechen demands. If the media were to act while Putin makes concessions, then settlement activity may emerge. The chances of such coordination in the near future are remote.

Uncertainty does affect policy and cannot be removed. By exploring the implications of unexpected moves one can anticipate with some authority how plausible actions will affect outcomes. In the case of Chechnya, unless a far more complex set of negotiations develops, a settlement of the current war is unlikely.⁴ Policy choices depend on the confidence assigned to subjective beliefs by policy makers seeking a desired outcome. Systematic analysis can provide effective risk assessment, reducing the variability in subjective evaluations across stakeholders. Moreover, through simulations, systematic analysis can effectively simulate the consequences of actions that *could be taken by key stakeholders*. When such actions advance the interests of one party, they could be encouraged. On the other hand, when unexpected changes detract from the current *status quo* policies designed to avert such actions can in many cases be implemented.

⁴ A possible solution could emerge were the U.S. to bargain over Chechnya while making concessions on their demands to widen the treaty on defense missiles. Russia opposes such developments.. This "solution" is unlikely given the high priority the U.S. assigns to ABM weapons contrasted with stability in Chechnya

Conclusions and Recommendations

We have spent some time exploring a few of the policy results of the National War College experiment. We have additional policy recommendations and analysis focussing on the interlocking relationships of the crisis with IMF loans, the ABM Treaty negotiations, and Russian economic reform. These issues are addressed by figures in the appendix but are not explained here for reasons of brevity.

Given our focus on gaming and simulations, it is worth noting that the classroom results of applying EU to the Chechnya crisis were impressive. This was the first time that the expected utility model was used at a Professional Military Education (PME) institution. While most of the student body was involved in a classic national strategy exercise set ten years into the future, three seminars devoted one week to exploring the current Chechnya crisis using first the traditional methods of analysis and then the expected utility model. The College then systematically surveyed students, faculty and wargaming center observers to determine the validity of EU as a teaching tool and as a crisis decision-making model.

The survey data indicated enthusiastic support for the EU model. Students and faculty found that student level of analysis was much more complex, prioritized, innovative and insightful using the EU model than the traditional form of “framework” development. All parties cited the value of dealing with a current rather than projected crisis. Students brought to the classroom their full knowledge base, not only of Chechnya but the current state of US national security assets and tools. By focussing on the nature of personal power, interests, and coalition building, students and faculty greatly accelerated their abilities to address complex national security questions.

The EU model of stakeholder analysis, combined with expert inputs, can provide decision makers with a guide to the future. Based on very limited but critical information regarding stakeholders - their position, the resources at their command and the commitment to the policy under consideration - it is possible to anticipate the political dynamics surrounding complex policy decisions. Such analysis can open new opportunities to produce stable outcomes and reduce the need to re-negotiate agreements.

Despite these advantages, the EU model is not a panacea for policy analysis, though it offers significant opportunities to achieve favorable goals. The systematic analysis of politics is no different than systematic analysis of economic options. There is no single answer, but it is possible to distinguish stable from unstable outcomes and anticipate the prospects that agreements once reached will be implemented following the principles agreed upon. Such an approach provides policy makers with a critical advantage in not only understanding policy dynamics but offers a proactive tool for change and treatment of uncertainty.

Perhaps of more importance is our evaluation that EU is the missing link in wargaming and simulations exercises. Expected utility offers the opportunity to come as close as possible to mimicking events in real time. Furthermore it offers practitioners an unrivaled possibility of actually manipulating events during a crisis—by exposing hidden courses of action,

unanticipated powerful coalitions, and successful alternate policy options. Thus it is a tool with educational, research and most importantly policy applications.⁵

⁵ We acknowledge the cooperation of Decision Insights, Inc., of New York, the firm that designed and supplied experts for the National War College experiment. DII holds the rights to the proprietary software that ran the analysis both for that experiment and for additional evaluations conducted for this paper. We also gratefully recognize the cooperation of the National Defense University Wargaming and Simulations Center, and its associated JMEANS program, which sponsored this experiment. The National War College has been generous in allowing us to cite their curricular innovation.

Technical Appendix

Adapted from Bueno De Mesquita 1997

The expected utility model is concerned with explaining how policy positions of competing interests evolve over time. It leads to predictions about policy outcomes and identifies strategic opportunities for altering them. As such, it can be used by political scientists to explain and predict political decisions at any level of analysis. It can also be used by policy makers to anticipate outcomes and to reshape them to be more in line with their own interests.

The model itself depicts a game in which actors simultaneously make proposals, and exert influence on one another. They then evaluate options and build coalitions by shifting positions on the issue in question. The above steps are repeated sequentially until the issue is resolved. In the game, each player knows three factors: the potential power and policy position of each actor on each issue examined, and the salience each actor associates with those issues. The decision makers, stakeholders, or players, do not know how much others value alternative outcomes or what perceptions others have about their risks and opportunities. Each decision maker chooses based on his or her perceptions and expectations, with these perceptions and expectations sometimes being in error.ⁱ

Of the infinitely many possible proposals to resolve some issue a , how are we to predict which will be chosen? To answer this question, let us first learn a little more about each actor i . In this analysis, each decision maker is endowed with three characteristics. Each player attaches some utility to each possible outcome on issue a , as already noted. Each participant in the bargaining process is also endowed with the power to exert some influence over decisions. Let c_{ia} be the capabilities (or power) actor i could bring to bear on issue a , such that the sum of the capabilities of the participants in a multilateral decision making setting is 1.ⁱⁱ c_i is, then, actor i 's share of the total potential influence that could be brought to bear in the negotiations over some issue a . Each participant has its own agenda of priorities or salience that it attaches to the issues that must be confronted. Thus, i may attach considerable importance to issue a and considerably less importance to issue b .ⁱⁱⁱ Any aggregation of individuals with identical values on all three of these variables can constitute a stakeholder for the purposes of this model. Differences on the available pool of resources or on preferred outcomes or on salience mean that the aggregation of individuals makes up more than one group and must so be treated.

Note that actors are defined only by the three characteristics of capabilities, policy preference and salience. This means that an actor can be an individual, a group, an entire nation, a bloc of alliances, international organization, or anything in between. In that sense, this is a quite generic model that is equally applicable to interpersonal decision making, group decision making and to interstate interactions. Its application recognizes no level of analysis restrictions.

When alternative courses of action are pitted against each other, the array of forces on either side often determines victory. Of course, this array depends on more than the relative power of the competing interests. It depends also on the willingness to spend influence on the issue in question [s_i]^{iv}--a budget constraint--and the intensity with which each actor prefers one proposed settlement^{iv}. Thus, each group has a total number of potential "votes" equal to its capabilities, a factor that may be influenced by external considerations and/or by the institutional arrangements that provide structural constraints on the decision making process. Where structural constraints are relevant, as in qualified majority voting in the European Union, Congressional voting following a presidential veto, Security Council choices, etc., the model can be readily adapted by changing its key decision rule -- the median voter rule -- to reflect the operative rule in the situation.

The "votes" cast by actor i in a comparison of alternatives x_j and x_k are said to equal v_{ia}^{jk} where:

$$(v_{ia}^{jk} / x_j, x_k) = (c_i)(s_i)(u^i x_j - u^i x_k) \quad (1)$$

Thus, the "vote" or power mobilized by actor i in a comparison of two alternatives (x_j and x_k) is equal to the potential capabilities of i discounted by how important the issue is to i (i.e., s_i) and by how much i prefers one proposal to the other ($u^i x_j - u^i x_k$).

The "voting" scheme reflects, if you like, what takes place "inside the smoke-filled room" before the formal, visible decision-making process occurs. It assumes that any formal process echoes the agreements reached beforehand. Put differently, it assumes that stakeholders anticipate future action in the immediately next stage of decision making, using backward induction. They anticipate how the formal decision making setting will influence all actions and pick proposals in the "smoke-filled room" that they believe will survive the formal process. Stakeholders are bounded in their rationality, however, in that they are unable to look farther ahead than the next

stage of decision making. So, their choices are locally rational, but may turn out to be inefficient two or more steps down the road.

The prospect that a proposal will succeed is assumed to depend on how much support can be mustered in its favor as compared to the feasible alternatives. This is calculated as the sum of "votes" across all actors in a comparison between x_j and x_k . This sum equals v^{jk} with

$$v^{jk} = \sum_{i=1}^n v_i^{jk} \quad (2)$$

If v^{jk} is greater than zero that implies that x_j defeats x_k because the tacit coalition in favor of j 's proposal is more motivated and powerful than the coalition supporting k 's proposal. If v^{jk} is less than zero, x_j is expected to be defeated by x_k and if v^{jk} equals zero the competing interests are collectively indifferent between the two alternatives.

In any negotiation, there are likely to be many more than two proposed settlements. By pitting all alternatives against one another two at a time, the outcome preferred by the median voter (weighted by power, salience and intensity of preference) is found. Barring perceptions or beliefs that lead decision makers to switch their position, the median voter position is the predicted outcome (Black, 1958). In the original version of the expected utility model, the median voter position was always the predicted outcome. However, the current version allows decision makers to switch positions in response to proposals and pressures from one another. By doing so, the model now provides a quasi-dynamic element.

In practice, perceptions or beliefs often lead decision makers to grant concessions or to give in to a rival's point of view, sometimes needlessly. Such concessions or capitulations can change the location of the median voter. For now we only note that the initial median voter outcome can be the predicted outcome provided key actors do not switch positions in a way that alters the location of the median voter. Of course, providing an accounting of when such switches in position are expected to take place is crucial.

The basic, median voter prediction is not the final prediction of the model. The beliefs and perceptions of the relevant actors frequently suggest compromises and concessions that one or another actor is willing to pursue and that other actors are willing or compelled to accept. These beliefs and perceptions may influence the array of interests sufficiently to require re-estimating the median voter, perhaps several times, until perceptions and positions stabilize around the "dominant" outcome. To undertake such before-the-fact analytic updating it is necessary first to develop the means to estimate the relevant beliefs and perceptions.

PERCEPTUAL ANALYSIS

The forecasting element of the model reveals what decision makers should expect if everyone acts sincerely according to their underlying preferences. What, however, can a decision maker do if the predicted outcome is not to his or her liking? Are there strategic maneuvers that can improve the expected outcome?

It is possible and indeed likely that actors will engage in private, sophisticated deals to rearrange the prospective resolution of a controversial issue. These deals may be the result of cooperation and coordination among a subset of stakeholders or they may be the product of conflict and coercion. When deals are produced by coordination among actors, the "deal making" reflects the essence of negotiations. The perceptual model guides inquiries to facilitate understanding which "deals" are feasible and which are not. It points out how to construct the dominant outcome with strategically sophisticated approaches to resolve a policy issue. If an interest group is dissatisfied with the expected outcome, there are essentially four courses of action by which this group--the focal group--might improve its prospects:

- (1) Alter its own level of effort (i.e., change s_i);
- (2) Shift its revealed position;^v
- (3) Influence groups who are willing or can be compelled to make concessions to the focal group to alter their level of effort (i.e., s_k); or
- (4) Influence groups who are willing or can be compelled to make concessions to the focal group so that those other groups alter their revealed position.^{vi}

Here we focus only on point 4, maneuvers that involve persuading or coercing other groups to switch positions, with the direction and size of any changes in position being dictated by the logic behind the model. Changes in salience are treated analogously. Decision makers interested in learning what leverage they can exert could benefit from estimating the beliefs held by each other actor.^{vii} These are used to estimate each player's expected utility from challenging or not challenging the policy proposal backed by each potential rival. They also help approximate the utility each actor i believes its rival expects to derive from challenging or not challenging the policy goals of actor i .

Decision makers are assumed to calculate the expected consequences of challenging and of not challenging alternative proposals. The expected utility for i from not challenging rival j 's position is denoted as $E^i u^i \ddot{A}x_j _$, with $_$ denoting the failure to challenge or make a proposal. This expected utility is estimated by projecting what the relevant decision maker believes is likely to happen without the exertion of pressure on a rival to persuade the opponent to alter its behavior. One of three contingencies may arise: actor i may anticipate that with some probability (Q^i) rival j is the type that will not alter its current policies over the period of concern to i , giving group i whatever utility it receives from the preservation of the status quo between itself and j [with ($u^i \ddot{A}x_j _$) being the associated utility]; i may anticipate that j 's position on the issues will change ($1-Q^i$), in which case there is some chance (T^i) that, from i 's perspective, the policies of j are anticipated to get better [with $u^i \ddot{A}x_j^+ _$ being the associated utility] or to get worse, with probability $1-T^i$ [with ($u^i \ddot{A}x_j^- _$), so that $u^i \ddot{A}x_j^+ _ > u^i \ddot{A}x_j _ > u^i \ddot{A}x_j^- _$ being the associated utility]. i 's expected utility if it leaves j 's proposal unchallenged is described as:

$$E^i u^i \ddot{A}x_j _ = Q^i u^i \ddot{A}x_j _ + (1-Q^i)[T^i u^i \ddot{A}x_j^+ _ + (1-T^i)u^i \ddot{A}x_j^- _] \quad (3)$$

i can challenge j 's position on issue a by proposing a change in j 's position. In doing so, actor i presumably takes into account the probability that j does not care enough about the issue to resist the proposed settlement by i ($1-s_j$). i also considers the possibility that j will resist i 's proposal (s_j). If there is resistance, then there is some likelihood that i will succeed in enforcing its wishes on j (P^i) and some probability that it will fail ($1-P^i$). Should i succeed, then i will derive the utility associated with compelling or convincing j to switch from its current policy stance to that supported by i . This is denoted by $u^i \ddot{A}x_j^+ d$, which equals $u^i(x_i - x_j)$. Should i fail, then it confronts the prospect of having to abandon its objectives in favor of those pursued by j , denoted by $u^i \ddot{A}x_j^- d = u^i(x_j - x_i)$. The expected utility for challenging j 's proposed resolution of the multilateral dispute ($E^i u^i \ddot{A}x_j d$) is:

$$E^i u^i \ddot{A}x_j d = s_j\{P^i[u^i \ddot{A}x_j^+ d] + (1-P^i)[u^i \ddot{A}x_j^- d]\} + [1-s_j][u^i \ddot{A}x_j^+ d] \quad (4)$$

so that the overall expected utility of i with respect to j 's outlook on issue a is:

$$E^i u^i \ddot{A}x_j = E^i u^i \ddot{A}x_j d - E^i u^i \ddot{A}x_j _ \quad (5)$$

Equations (3) and (4) reflect each actor's effort to look ahead and estimate the consequences of alternative actions. The difference between the two initial actions -- challenge or not challenge -- is represented in equation (5). If equation (5) is greater than zero, then i believes that challenging j 's position is superior to not challenging it. In that case, i is assumed to make a proposal of its own. If equation (5) is less than zero, then not challenging is preferred and i is said to be deterred. If (5) equals zero, then i is indifferent between challenging and not challenging j 's proposed settlement. Each actor evaluates equation (5) vis-a-vis each other actor. In doing so, actors consider the expected actions of third parties. The estimates of P^i , the subjective probability that i will be successful, include calculations of how i expects all other parties to respond to a dispute over policy settlements between i and j . In particular, P^i places each other actor in i 's coalition, j 's coalition, or in a neutral position as indicated by each third party's preference for i 's policy proposal or j 's. i makes a comparable calculation (as does each $k \neq i, j$). Because equation (5) includes such subjective elements as utilities and subjective probabilities, estimating a complete matrix of expected utilities that capture all possible confrontations is possible, compromises, and capitulations among all the participants in the relevant political arena.

Once the expected utility values are estimated, we can denote each relationship between pairs of stakeholders. If equation (5) is positive for i and negative for j then the relationship implies either compromise or coercion. If the value of (5) for i is greater than the absolute value of (5) as calculated for j then both players agree that i has the upper hand. In this instance, j is expected to be willing to offer concessions to i , although the concessions are not likely to be as large as what i would like. The likely resolution of their exchange is a compromise reflecting the weighted average of i 's expectations and j 's. If equation (5) is positive for j and negative for i and the absolute value of (5) from j 's point of view is larger than the value of (5) from i 's perspective, then j is compelled to accept i 's wishes unless someone else offers j an enforceable compromise that spares it from having to capitulate to i . If both i and j believe that they have the upper hand in the relationship, then conflict is likely and that conflict has an uncertain outcome. In international disputes, this situation is highly correlated with the probability of a war (Bueno de Mesquita, 1985). Should both i and j believe that equation (5) is negative for them, then there may be blustering and bluffing. Nevertheless, the expectation is that the relationship is a stalemate. The most likely outcome is that the status quo will continue to prevail between i and j .

ESTIMATING THE MODEL

The various components of equation (5) must each be measured for the model to have practical value. The measurement procedures are explained in considerable detail elsewhere (Bueno de Mesquita, 1985; Bueno de Mesquita, Newman and Rabushka, 1985; Bueno de Mesquita and Lalman, 1986; Bueno de Mesquita, 1990; Bueno de Mesquita and Lalman, 1992), so here we provide only brief, summary descriptions of the methods used for estimating each of the key variables.

The estimation of the subjective probability of success for i in a competition with j 's is accomplished as follows:

$$P^i = \frac{\sum_{k=1}^n \frac{u^k x_i > u^k x_j}{v_k^{ij}}}{\sum_{k=1}^n v_k^{ij}} \quad \text{for all } k \in N.$$

The probability measure has its origins in earlier theoretical work on third party choices during disputes. Altfeld and Bueno de Mesquita (1979) report a high rate of accuracy in predicting third party decisions to join ongoing wars based on a model that yields an expression that is virtually identical to the numerator for P^i . The denominator simply normalizes the value in the numerator so that the overall term falls in the interval (0,1). The numerator and denominator have straightforward political interpretations. The numerator calculates the support i can expect to receive in a confrontation with j . This support depends upon the capabilities of each actor who prefers i 's policy objective to j 's. However, capabilities alone are not sufficient information to estimate the value of each third party's support. The capabilities are diminished by the degree to which the issue in question is not salient to the actor whose support level is being estimated. The lower an actor's salience score, the less likely the stake holder is to spend resources on the issue in question as it is not an issue of much concern to the decision maker. Finally, the capabilities must also be discounted by the intensity of preference of the actor in question for the outcomes under contention. If a third party is just about indifferent between supporting what i wants and supporting what j wants, then putting much effort behind helping i win is not likely. If, however, a stakeholder intensely favors i objective over j 's, then it uses more of its capabilities to help i . Thus, the numerator captures the expected level of support for i . The denominator reflects the sum of the support for i and for j so that the overall expression shows the gambling odds for i .

The probability calculation is subjective in that i 's estimate of its chances for success may be quite different from j 's estimate of the same value. The subjective component is introduced by using estimates of the individual risk-taking profiles of each decision maker. In particular, the utilities for the specific proposals (e.g. x_i , $x_j \in R_a$) that enter into the calculation of v_k are evaluated so that:

$$u^i x_j = 1 - x_i - x_j^{r_i} \quad (6)$$

with r_i --the indicator of risk-taking propensities--estimated as described below.

The risk-taking component is complex. It is explained in detail in Bueno de Mesquita and Stokman (1994) and only summarized here. The risk indicator estimates the size of the tradeoff made by each decision maker between pursuing political satisfaction and policy satisfaction (Lamborn, 1991). By political satisfaction we mean the desire to be seen as a deal maker, as an essential member of the winning coalition, even if that means backing an outcome that the decision maker really does not like. Political satisfaction enhances personal political security and welfare. By policy satisfaction we mean supporting a substantive policy outcome close to the actor's most preferred choice even if that means losing to an inferior choice. We assume that all decision makers tradeoff at some rate between the pursuit of policy goals and political goals.

Political security is, of course, a central idea in much of politics, but what does it mean in this context? The closer in expected utility terms an actor's public position is on a policy issue to the median voter position, the more secure and the more risk averse the actor is. The median voter position is the most politically advantageous location on a unidimensional continuum with majority rule, whether that majority is votes or power. After all, the key characteristic of the median voter position is that in head to head competition it beats all alternatives. Therefore, the decision to locate close to the median voter in expected utility term reflects a fear of vulnerability or a tendency to be risk averse. This presumption of risk aversion follows from the notion that the actor has chosen a position that minimizes threats to its security at the expense of pursuing what it really wants. The farther the decision maker's expected utility score is from

$$R_i = \frac{2 \sum_{i=1}^n E^i U_{ij} - \sum_{i=1}^n E^i U_{ij_{\max}} - \sum_{i=1}^n E^i U_{ij_{\min}}}{\sum_{i=1}^n E^i U_{ij_{\max}} - \sum_{i=1}^n E^i U_{ij_{\min}}}$$

being at its possible maximum, while remaining within the feasible set of alternative proposals, the more risk acceptant the decision maker is presumed to be. Algebraically, the risk calculation is $R_i =$ and $r_i = 1 - (R_i - 1/3)/(R_i + 1/3)$ so that r_i ranges between .5 and 2.

The measure of risk taking provides one perspective on how much each decision maker appears to have exchanged personal political security for policy goals or vice versa. In doing so, the risk-taking measure also provides a basis for estimating the value attached to the status quo. The first term in the numerator of the main expression for estimating risks is equal to the security and policy value of actor i 's actual or "stated" position; its value for the status quo. The next two terms place the "status quo" value within the boundaries of what could have been attained in terms of political security or policy. These three values -- the actual expected utility, the maximum feasible expected utility and the minimum feasible expected utility -- can be estimated. They evaluate three levels of political satisfaction: the one realized by the decision maker, the most political welfare the actor could have realized and the least. Because we already have estimated utilities or satisfaction on the policy dimension, those utilities plus these three scores provide sufficient information to plot indifference curves of the sort found in figures 1 and 2.

Utilities for the marginal gains $[(u^i \Delta x_j^+ \text{ d and } u^i \Delta x_j^+ \text{ _})]$ or losses $[(u^i \Delta x_j^- \text{ d and } u^i \Delta x_j^- \text{ _})]$ from shifts to alternative proposals are evaluated, using the basic building block just described, in the manner delineated in Bueno de Mesquita and Lalman (1986) and following equation (6). $u^i \Delta x_j^+ \text{ _}$ and $u^i \Delta x_j^- \text{ _}$ are approximated by comparing the value actor i attaches to the current median voter prediction to the value i attaches to the median anticipated if i accepts j 's preferred outcome.

Equation (5) is estimated from four perspectives, with relevant superscripts on equation (5) showing from whose perspective the calculation is being viewed:

- (1) i 's expected utility vis-a-vis each rival j 's proposal;
- (2) i 's perception of each j 's expected utility vis-a-vis i 's proposal;
- (3) j 's expected utility vis-a-vis each i 's proposal;
- (4) j 's perception of each i 's expected utility vis-a-vis j 's proposal.

The expected utility values summarized in (1) and (2) and in (3) and (4) respectively describe each actor's perception of its relationship vis-a-vis each other actor. With Banks's monotonicity of escalation

result in mind, these relationships can be described in continuous form. According to Banks's theorem, the probability with which an actor anticipates confronting a given rival increases with its expected utility for challenging the rival's proposal. This means that the higher i 's expected utility from persuading j to accept i 's position, the higher the likelihood that i will confront j .

When the expected utility values (as perceived by either or both actors) favor a challenge by both i and j then a confrontation is likely in which neither actor is inclined to offer concessions or to bargain. Such conflictual situations involve high political costs and great uncertainty regarding the ultimate outcome. When, however, one actor expects to gain more by challenging a rival's position than by doing nothing and the other actor anticipates greater losses than gains in a confrontation, then the costs of resolving the issue are greatly reduced and the prospects of an amicable settlement are enhanced. If one side expects to gain more than the other side is prepared to give up then there is an opportunity to negotiate over the difference in expectations. In the event one protagonist anticipates losing more than the other protagonist believes it stands to gain, then we expect that the side anticipating a loss gives in to the demand of its rival. Finally, if both sides believe there is more to be lost than there is to be gained by challenging the other party's position, then the status quo between them is expected to prevail. Here any demands or proposals are likely to be mere bluffs and bluster without credible substance behind them. By examining the distribution of information in graphs like Figure 3, it is possible to estimate how each party will behave and what consequences are likely to ensue.

What information does the perceptual model reveal? Recall that every decision maker is assumed to know the array of potential power, positions and salience of each other decision maker. That information is common knowledge. The private information possessed by each decision maker involves the shape of its own utility function and the belief it holds about the expected utilities of each other actor. Thus, everyone is assumed to know the basic information that goes into the expected utility model. Everyone knows the shape of their own utility function, but can only form a belief about the shape of the utility functions of other decision makers.

The beliefs of each actor imply actions. Those actions, as the extraction or granting of concessions over support for this or that specific position, lead to a re-evaluation of the situation by each decision maker. As stakeholders respond to revised proposals, with their responses supported by their beliefs and expectations, the prospects for a favorable or unfavorable settlement change for many participants. Beliefs and expectations provide the foundation for a quasi-dynamic assessment of the evolution of issue positions and to recalculations of the location of the median voter.

When actors are persuaded or coerced into accepting a proposal different from their initial (or current) position on an issue the decision process enters a new phase. Coalitions change and the support or risks associated with alternative proposals vary. New proposals are brought forward as revised beliefs and expectations open new possibilities or foreclose old ones. Each such sequence of revised stances on an issue is called an iteration or bargaining round. These two terms are used interchangeably. The model computes as many iterations as it takes for the policy issue to resolve itself. Issues resolve by reaching a stable outcome, an outcome from which there seems not to be a meaningful possibility of change given the estimated expectations of the actors.

If a player believes his or her hand is very weak compared to a specific rival, then no proposal is made to that actor. If i expects to lose to j , for instance, then i does not make a proposal to j . If, however, i thinks it holds a good hand relative to j then i makes a proposal in the form of a suggested change in position by j on the issue at hand.^{viii} If i thinks j stands to lose quite a lot, then i will propose that j accept i 's current position.^{ix} If i thinks it has a good enough hand to shift j 's position, but not so good that j will give in to what i wants, then i proposes a compromise somewhere between i 's position and j 's.^x

After all the players have submitted their secret proposals to one another, each player now reviews the new cards -- the proposals -- that it holds. Of course, some proposals are better for the recipient than others. Indeed, some proposals turn out to be frivolous in that the proposer cannot enforce the proposal, something that the proposer might only learn at the end of the round of proposal making. Other proposals received by a decision maker are potentially enforceable, but fall by the wayside because a superior, enforceable proposal was made by a different player. Each player would like to choose the best offer made to it and each proposer enforces its bids to the extent that it can. Those better able to enforce their wishes than others can make their proposals stick. Given equally enforceable proposals, players move the least that they can. Each actor selects from among the bids it made and the bids it received. The bid chosen is the proposal that is the optimal choice for the player given the constraints under which it operates. These

constraints include its own perceptions and the reality of which proposals turn out to be enforceable and which turn out to be beaten back by rivals or rejected outright as unenforceable by the recipient.

At the end of a round of proposal making, players learn new information about their opponents. If, for instance, a player finds that some proposals it thought of as enforceable are successfully rejected then it learns the proposal was unenforceable (i.e., the player has less support than it thought). By monitoring responses to its proposals a player learns how much leverage it has with other decision makers. If a proposal is accepted, then a player learns that it made the best offer among all the proposals made to the recipient of its accepted bid.

When the players finish sorting out their choices among proposals, each shifts to the position contained in the proposal it accepted. Of course, when a decision maker agrees to a compromise with another actor, it hopes that the other player will also live up to its end of the compromise bargain. But this is a game in which promises are not binding. Proposals are enforceable if a decision maker has the means to make sure that another actor does what it says it will do. Each player is free to renege on a proposed deal so long as it can enforce another agreement or so long as someone else can enforce an agreement on it. What consequences follow from the actions implied by the first iteration through the model? How do those actions influence the location of the median voter? How do we decide when the median voter outcome at a particular iteration is to be taken as the actual resolution of the issue at hand? If no stakeholder believes it has a remaining credible proposal, then the game ends. Similarly, if the value of remaining proposals is sufficiently small that the cost of continuing to bargain outweighs the value for each player of the expected improvement in the outcome, then the game ends. The median voter at that stage of the game is the predicted policy outcome. If, however, credible proposals are believed to remain, then the game continues (For a fuller description of the sequential process, see Bueno de Mesquita and Stokman, 1994).^{xi}

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1. Let $N = \{1, 2, 3, \dots, n\}$ be the set of actors or stakeholders trying to influence a multilateral decision. An actor might be a government representative, an official from a faction within a political party or a bureaucracy, a leader of some interest group, an influential private citizen, and so forth. Let $M = \{a, b,$

$c, \dots, m\}$ be the set of issues in a multilateral negotiation and let R_a be the line segment that describes the unidimensional policy continuum for any individual issue a selected from among the larger set of issues M .

Let each actor $I_i \in N$ (i.e., I_i is a member of the set of actors trying to influence the decision), have its own preferred resolution of issue a , with that preferred resolution denoted as x_a^* . x_a^* is the outcome actor I_i has revealed to be preferred on issue a . It may or may not be I_i 's true ideal point. We generally do not know for sure what another actor's true ideal point is as there are strategic incentives for an actor to misrepresent his or her ideal point. Because the model as applied here assesses policy decisions on one issue at a time, we drop the issue-denoting subscript (a , or b , etc.) from the notation so that henceforth x^* is the preferred position of actor I_i on the issue being evaluated at the moment.

For any feasible proposed outcome on issue a , say k 's proposal, x_k , I_i 's utility for x_k , $u^i_{x_k}$, is a decreasing function of the distance between the proposal and I_i 's preferred resolution, so that $u^i_{x_k} = f(-x_k - x^*_i)$. This means that proposals farther away from actor I_i 's preferred outcome are of less value to I_i than are proposals closer to I_i 's preferred outcome.

2. Again we will drop the "a" subscript from the notation throughout, but the reader is alerted to the fact that the model does not assume that an actor's capabilities or potential power is the same on all issues.

3. Denote the salience of issue a for actor I_i as s_{ia} , with $0 < s_{ia} \leq 1$. Each actor is described by the values of $u^i_{x_k}$ for all $i, k \in N$, c_i , and s_i on each issue. S_i is assumed to be greater than zero because if it were equal to zero for more than one stake holder then it is possible for division by zero to arise in the computation of the model. Strictly speaking, then, the model can tolerate one actor with a salience of zero. Still, this is an odd concept in that it implies that there is a stakeholder who does not care at all about the issue in question. In that case, the actor in question really does not have a stake in the decision. Each actor is described by the values of $u^i_{x_k}$ for all $i, k \in N$, c_i , and s_i on each issue.

4. Say j 's proposal ($u^j_{x_j}$), to another proposal, say k 's ($u^k_{x_k}$).

5. That is, selecting x_i such that $u^i_{x^*_i} \neq u^i_{x_i}$;

6. That is, to alter x_k so that $u^k_{x^*_k} \neq u^k_{x_k}$.

7. To do so requires a focus on the three characteristics: $u^i_{x_j}$ for all $i, j \in N$, s_i , and c_i .

8. Player i makes a proposal if, in figure 3, the conjunction of i 's expected utility and i 's estimate of j 's expected utility falls between zero degrees from the horizontal axis and 45 degrees or falls between 270 degrees and 360 degrees from the horizontal axis. That is the domain within which i believes it has a comparative advantage over j and i expects more gains than losses from challenging j 's position.

9. A proposed acquiescence or capitulation by j to I_i 's wishes is made if i locates the conjunction of the respective expected utilities in the wedge that falls between 270 degrees and 315 degrees below the horizontal axis in figure 3 or in the wedge between zero degrees and 45 degrees. In the latter instance, i expects resistance from j , but i believes it can enforce its demand. In the former case, i expects no resistance from j .

10. A compromise is proposed if i believes the conjunction of the relevant expected utilities falls between 315 degrees and 360 degrees from the horizontal axis in figure 3.

11. For software based on this model or more information about its policy use history, interested parties should contact Decision Insights, Inc., 60 East 42nd Street, Suite 514, New York, New York 10165, (212) 922-9876.